Modifications made to SURPAC Version 5.03, Release 01

Displaying the "Printed Pages"

The "**Printed Pages**" function is designed to provide an exact reflection of the Pages sent to the Printing device, excluding Plotted CAD sheets. This function is designed to overcome some past problems, such as :-

Due to the **Windows** spooling of single and multiple printer pages, it is sometimes impossible to know exactly what has been printed recently, without making **SURPAC** dump the spooled information.

When the printer is a network printer, located some distance from the user's computer.

When output is being sent to an **ASCII** file (using the ***.VPG** option), the data sent is not readily visible.

The function allows for the on-screen display of the "**Printed Pages**" information, applicable to the current Co-ordinate File . All existing **Printed Pages** for the current File will automatically be loaded at the same time that the Co-ordinate File is loaded. If the current Co-ordinate File was created before the installation of **Version 5 of SURPAC**, then only those **Printed Pages** generated since the installation will be loaded.

The information is displayed in a Form displayed at the top right corner of the **SURPAC** screen. When the **1024x768** (XGA) resolution is used this Form is displayed automatically along with the **SURPAC** Calculator. For the 800x600 (SVGA) resolution, this Form will only be displayed if the appropriate Menu Item is selected.

The Printing Area maybe set at a reduced size, or an enlarged size. The reduced size uses less screen area, but the text is more difficult to read. The enlarged size is much easier to read, but takes up more screen area. It is advisable, therefore, to toggle between these two sizes as is required.

The "**Printed Pages**" data are held in an **ASCII** File. A **Printed Pages** File, therefore, may be loaded into any Text Viewer, or Word Processing software application.

SURPAC Colour Scheme

You can now set your own, personalized colour scheme for the display of lists of co-ordinates, observations, point names etc. Apart from looking better than bland, white displays, this facility makes it visually easier to locate items along a line of data. You can also set a "Set Up" high-light colour, which helps to more easily identify Set Up lines in an Observation file listing.

The SURPAC Main Menu System

The **SURPAC** menu system has been modified to display Icons for the individual menu items. Once the Icons have become familiar to you, you will find that menu item selection becomes easier when looking for an Icon, rather than a line of text.

SURPAC Help Pages

This facility has been improved in that when the **F1** key (special function key F1) is pressed, the **Help Page** displayed will be the Help information for the programme currently being run.

If you are running the Field Traverse programme, for example, pressing the F1 Key will bring up the Help Pages listing, set at the Field Traverse information.

For the **Graphic** (**CAD**) programmes, this function is taken one step further. If you **double**-**click** a Menu Heading of a Graphic programme, then press **F1**, the **Help Page** display will show the Help information for the menu items available under that Heading.

SURPAC CAD Programmes

The various **Graphic (CAD)** programmes of **SURPAC** (*CAD Plotting*, *Contour Plotting*, *General Plan*, *Data Sheet*, *Working Plan*, *Diagram* and *Sectional Title* programmes) have been substantially modified, and now include a number of new features.

Toolbars

With the exception of the ***Contour CAD*** programme, these programmes now include **Fixed Toolbars** on the right hand side of the screen. These Toolbars, which may be personalized, allow for rapid Command selection when carrying out graphic construction, or editing.

The ***Contour CAD*** programme has a **Floating Toolbar**, which is also used for rapid Command usage.

Help Information

If you double-click a **Menu Heading** of any Graphic programme (except the ***File*** Heading), then press **F1**, the **Help Page** display will show Help information for the menu items available under that Heading.

If you double-click the ***File*** Heading, the overall Help information for the current **CAD** programme will be displayed**.**

Edit facilities

All **CAD** programmes (except the Contour **CAD** programme) now include an "**Erasure Polygon**" function.

You can define a polygon (up to 200 sides), covering any portion of the Sheet, in which either Lines, Text, Lines and Text or Points can be erased. Lines extending beyond the defined polygon will be trimmed to the relevant polygon side.

The Contour **CAD** programme has a similar routine for deleting contour lines, or portions of contour lines.

Most CAD programmes now include a **"Add Co-ord Values to Plot Items"** function**.**

Data Writing Commands

The Commands for writing **Line** and **Stand Data** have been modified, for easier use. The same ***[T] – Write distance, [U] – Write Direction, [F] – Write Direction/Distance, [f] – Write Distance/Direction*** **and** ***[Z] – Write Splay Data*** are applicable, except that these are now **"point-and-click"** Commands**.**

It is no longer necessary to use the ***[P0] – No Pen*** Command, followed by the ***[S] – Start*** and ***[E] –End*** Commands to define a Line, or Line portion required for computing the Data to be written.

Now you only have to move the cursor close to, and on the desired side of, a Line and then give the required Data Writing Command. The programme will calculate (by looking at surrounding Stand/polygon Lines) whether the entire Line, or just a portion of the Line, is to be used for computing the Data to be written.

The **"smart keys", [F10], [F11] and [F12**], used for automatic **Stand/Block** data writing and **Area** calculation, still apply as before. **(*General Plan*** and ***Sectional Title*** programmes only).

Line (Draw) Commands

The Line Command list has been extended to include such Commands as Line Dimension, ***Line Generate***, ***Line Subdivide***, ***Line Replicate***, ***Line Trim***, ***Write Line Data***, ***Line Logical***, ***Line Intersect*** etc.

The selection of ***Line Colour*** **(Pen number),** ***Line Style*** and ***Line Thickness*** is from the Pull-Down menu, or from a Toolbar.

Text Commands

The selection of **Text Colour (Pen number**) is from the **Pull-Down menu,** or from one of the **Toolbars.**

Import Commands
Import Commands now allow for the rapid transfer of **Line, Arc, Circle** and **Text** data between the ***CAD Plotting*****,** ***General Plan*****,** ***Sectional Title*** **and** ***Working Plan*** programmes, as well as between any of these programmes and ***TopoCAD CAD/GIS*****.**

All **SURPAC CAD** programmes support the DXF output format**.** The ***CAD Plotting*****,** ***General Plan*****,** ***Sectional Title*** **and** ***Working Plan*** programmes support the import of DXF data.

Image Commands
All the **CAD** programmes are able to import, create and/or export **Graphic Images**. A number of image file formats are supported for file importing. A graphic file may be imported from a stored disk file, or from the **Windows Clipboard.**

An imported Image may be **moved, shifted, re-sized, flipped** or **removed. Images** can be shown **"on top"** of other sheet items, or behind them, depending on the Image's function.

Images can vary from a full sheet background image, to a small Image, such as a digitized signature.

Hatching (CAD Plotting programme only)
The **CAD Plotting** programme now supports the **Hatching** of closed **Polygons.** A number of different **Hatch styles** and **colours** are available.

Point Marking (CAD Plotting programme only)
The **CAD Plotting** programme allows for displaying **Mark Symbols** at co-ordinate **Point** positions**. Mark symbols** include **circles, double circles, triangles, squares, Trig. Symbols and Reference Mark symbols.**

For any **Mark,** the User may specify a **Mark Colour**, a **Mark Background Colour** and a **Mark size.**

Points are **Marked** by setting the required **Mark type**, **colour** and **size**, and then using the normal **Name** Command (N1, N2 etc.).

Marks can be set en masse, if required.

Another variation of a **Mark Symbol** is the **Spot Height. Points** can be displayed as **Spot Heights**, if they have associated **Heights**. This can be done individually, or en masse.

Spot Height colours and **sizes** may be User set.

Line to Point Conversion (CAD Plotting programme only)
The CAD Plotting programme includes a function for **converting Line terminals to Points** stored, in the current co-ordinate file.

This can be done a Point at a time, or en masse.

Modifications made to SURPAC Version 5.03, Release 02

1. Creation of GSI – 8 bit ASCII file for Co-ordinate data

This additional programme allows for the conversion of co-ordinate data from a **SURPAC** Co-ordinate file to a **Leica (Wild) GSI – 8 bit** format **ASCII** file.

- Whilst in the **Co-ordinate File Editing** programme, select the **[Options]** button, then select the "**Export Data to an ASCII Text File**" option and click the **[OK]** Button.

OR

- Whilst in the **Co-ordinate File Editing** programme, do a Right Button Mouse click and then select the "**Output [Y, X, Z ….] to an ASCII File**" Menu item from the Pop-Up Menu.

From the displayed option form, select the "**Use the Leica (Wild) GSI – 8 bit Output Format**" check box and then click the **[OK]** button.

2. Converting ASCII Observation data stored in the "OrganiSUR" Format

This additional programme allows for the importing and restructuring of an **OrganiSUR** observation **ASCII** file (File type ***.ODB**).

- Whilst in the **Observation File Editing** programme, select the **[ASCII Import]** button, then select the "**OrganiSUR Format**" option and click the **[Proceed]** Button.

- Select the required **ASCII** file (File type ***.ODB**).

- From the displayed form, select the required **Option Settings** for importing and converting the observation data. **OrganiSUR** Code 3 observations (Polars and/or Tachy shots) often contain only Point descriptions, or only Point Names. It is important, therefore, to select the appropriate action to be taken for these observations. **OrganiSUR** Code 2 observations (defining Set-Up stations) do not differentiate between "Fixed" and "Free" Stations, so you need to select the appropriate action for allocating the required **SURPAC** Set-Up Codes. Other options exist which allow for the combination of CL and CR observations (Code 4 with Code5 [HA] and Code 6 with Code 7 [VA]). Code 10 observations (Orientation checks) can also be combined with Code 4/Code 5 observations, if required.

- Other assumptions are made by the programme, when converting data. For example, if an **OrganiSUR** Code 4 observation has no associated Distance (Code 8) it is allocated a **SURPAC** Code 4 (orientation). If it does have a Distance, it is allocated either a **SURPAC** Code 3, or a Code 6, depending on the status (Free or Fixed) of the observed Point.

- As with all downloaded or imported Observation files, it is advisbale to employ the "**Scan the Observation File for Obs. Code Inconsistencies**" option (via the **[Options]** button), to identify and correct any inconsistencies that might exist, before proceeding with any file reduction routine.

3. Re-scaling Linear Data (Distances & Target Heights) in an Observation File

This additional function allows for the re-scaling, or re-dimensioning of **Distances**, **Target Heights**, or both, contained in the currently loaded **Observation** File. This is a useful function for correcting linear data that have been downloaded, or imported, using an incorrect conversion factor. This is especially applicable to Leica Total Stations which measure to either 1mm or 0.1mm accuracy. If the wrong assumption is made at download time, all **Distances** and **Target/Instrument Heights** will be incorrect by a factor of 10. This problem can now be corrected very easily by using this function.

- Whilst in the **Observation File Editing** programme, select the **[Options]** button, then select the "**Apply a Selected Factor to all Distances and/or Targ. Heights**" option and click the **[OK]** Button.

- From the displayed form, select or enter the required **Scale Factor** to be applied.

- Finally, select the items to be changed (**Distances**, **Target/Instrument Heights**, or both) and finally click the **[OK]** Button**.**

4. Image Importing for the CAD Plotting and General Plan Programmes

The **Adding** (Importing) of **Images** (*.BMP, *.JPG, *.GIF, *.ICO, Standard and Enhanced Metafiles formats) has been upgraded for these two programmes.

- When selecting the **Add (Import) a Sheet Image** Menu item from the **Image** Main Menu bar, a form will be displayed allowing you to select a required **Drive** and **Folder**. All existing **Images**, of the above types, will be listed for a defined Drive and Folder. A single mouse Click on any of the listed **Images** will display that **Image** on the right hand side of the form.

- There is also a **Check box** that allows you to select an **Image** from the ***Windows*** **Clipboard** rather than from a disk stored file.

- Once the required **Image** is displayed on the form, Click the **[Select Current Image]** button at the bottom of the form. This will Select the **Image** for placement on the current Sheet, at a User defined **Position** and **Size**.

- To place the **Image**, first click the Mouse at the required Top Left position for the Image. The **Image** will be displayed at a default size. Then move the Mouse in the Left <–> Right direction to enlarge or decrease the **Image** until the desired size is reached. During this process, the aspect ratio (width to height ratio) will not change. Once the required size has been reached, click either the Left or the Right hand Mouse button. The **Image** will now become a part if the Sheet information.

- The aspect ratio of the **Image** can be changed by selecting the **Resize a Sheet Image** Menu item.

5. Rotating Images in the CAD Plotting and General Plan Programmes

Rotating Images in these two programmes has been improved. The display and plotting of rotated **Images** is a now much faster and of better quality.

- **Note** : When an **Image** is **Added** (**Imported**) it, by default, appears in a vertically aligned rectangular area. The **Image** automatically adopts the orientation of the Sheet at the time the **Image** was loaded. Hence, if a Sheet has an orientation (swing) of –30° when an **Image** is Imported, that **Image** will only be displayed as a vertically aligned Image when the Sheet's orientation is –30°. Changing the Sheet's orientation will cause the Image to be displayed as a rotated **Image**.

7. Single Point Fix – Point Trilateration (by Least Squares)

This programme has been modified so that it now uses any combination of **Forward** and/or **Backward** measured **Distances** to **Trilaterate** the defined Point. The minimum number of distances is 3.

- The programme will search through the current **Observation** file, or defined portion of the **Observation** file (by setting the start and end Lines) and extract all measured lines to, and/or from, the designated Point that is to be fixed. All **Distances** will then be reduced and used to carry out a simultaneous Least Squares fix and adjustment of the Point's **[Y, X]** (or **[E**, **N]**) ordinates.

8. Other SURPAC Changes

Other changes and corrections have been made to various **SURPAC** programmes. In general, these have been made in response to problems, or requests, from **SURPAC** Users.

Briefly, these include :-

- Downloading Observation data using the **Leica GSI – 8** format (additional options),
- **Intersection** programme for a **Direction** and a **Distance** (the 2nd option had incorrect values),
- **Tacheometric** file generation from an **Observation** file (the first 3 lines sometimes went AWOL),

- The **Name** position **0** in the **General Plan** programme (the Point circle was not being shown),
- **Goldfield > Lo** conversions when using **Metres** (the incorrect factor was being applied),
- **UTM Zone to Zone** Conversions
- Extending the **maximum** number of Points observed at a single Set-Up for **Trig**. **Heighting** to **60**,
- The "**Fieldbook**" output option of an **Observation** file was not working (Error 54),
- The "**General Obs. File Reductions – to the Co-ordinate File**" programme now display the **[DY**, **DX**, **DZ]** values, the linear **mis-closure** and the **Class "A"** limit for double (or multiple) **Polar** calculations.
- The **Size** and **Position** used for the **SURPAC** software display, plus the optional display of the **Printed Pages** and the **Calculator** Forms, are recorded when you **Exit** from the **SURPAC** application. The next time **SURPAC** is **Run**, these settings are automatically recalled and applied. The settings are stored, under the appropriate headings, in the **Surpac5.ini** file, found in the "**C:\Windows**" (or "**C:\WinNT**" for **Windows NT**) folder.

Modifications made to SURPAC Version 5.03, Release 03

A reminder on Screen Resolution and Colour Setting

SURPAC Users are encouraged to use the 1024 X 768 screen resolution, especially if the screen size is 15", or larger.

For the proper display of the Colour palette, the Menu and Toolbar Icons and contour background shading, the Windows "*Colors*" setting should be set to *High Color (16 bit) (or 16384 colors* for Window NT).

Using the lower, 256 colour setting will cause strange looking Icons and background shading.

Do not use the "*True Color (24 bit")* setting. This colour level uses extensive memory and will cause an "Error 480" (Can't create AutoRedraw image !!" problem when running any of the SURPAC Graphic (CAD) programmes, if you have a graphic card of 8MB RAM, or less.

Both the above "*Screen Area"* and "*Colors"* settings can be set, or checked, via the "*Display*" Icon, in the Windows "*Control Panel"*.

Summary of SURPAC modifications made in Version 5.03, Release 03

1. The Printer to Plotter swapping problem, encountered by some Users, has been rectified.

2. When importing **a Leica GSI** file into a **Co-ordinate File**, it is now possible to use either the **8-bit GSI format**, or the **16-bit GSI format**. (Via the **[Options]** Button in the ***Co-ordinate File Editing*** programme.)

3. All **[Y, X]** co-ordinate values and/or **[Z]** values can now be instantly converted and re-stored by applying a User defined factor. (Via the **[Options]** Button in the ***Co-ordinate File Editing*** programme.)

4. A new Function has been added to the Pop-Up Menu that appears when a Mouse Right Button Click is made, whilst in the ***Co-ordinate File Editing*** programme. This function will bring up a Form that displays all existing **Cadastral ancillary CAD** Sheets related to the current Co-ordinate File, e.g. General Plan Sheets, G.P. Data Sheets, Sectional Title Sheets and Working Plan Sheets. This useful for quickly checking on the status of existing Cadastral information for any given Co-ordinate File.

5. A new feature has been added to the ***Observation File Editing*** programme. The Observation Code entry box has been changed to a "Drop Down" list. This list contains the allowable 9 **SURPAC** Observation Codes, plus an extra item shown as "??".

   When entering data, you may select the required Code by simply clicking the appropriate number on the displayed list or, if you prefer, enter the number manually, as before.

   Clicking the "??" item will display an Information Form which shows the full meaning of the **SURPAC Observation Codes**. Whilst this form is displayed, you can also click the required Code on this form, in place of clicking in the Drop Down list.

   The Information Form can be cleared by clicking the **[X]** Button in its top right corner. Re-displaying the Form can be done by either clicking the "??" item in the Drop Down list, or by selecting the appropriate option, after clicking the **[Options]** Button.

Modifications made to SURPAC Version 5.03, Release 04

Summary of SURPAC modifications made in Version 5.03, Release 04

1. Downloading and Uploading facilities for the SOKKIA SET300, SET500 and SET600 Series.

2. Fix up of the premature Page Printing problem when exiting from Polars, Joins, Intersections etc. (This was a problem only encountered with some Printers.)

3. Fix up of the Line Running problem, where the closure Point had its Calc. Page Number incorrectly changed.

4. When an Observation file is opened (in the *Observation File Editing* programme) it is now checked for any deleted lines. If the number of deleted lines exceeds 3, then the file is automatically "Purged". This is to prevent possible problems that can be encountered when Observation files containing large amounts of deleted lines are used for Network Adjustment etc.

5. The CAD Plotting Programme (see the "General" Menu) has been extended to accommodate an unlimited number of lines, arcs and/or circles. Amongdt other things, this option allows for the importation of large DXF files. This has been tested for DXF files of up to 12MB in size.

Modifications made to SURPAC Version 5.04, Release 01

1. Setting the Function Key [SFK] Allocations

Programme Description

This programme allows you to allocate, or link, any of a wide range of **SURPAC** Programmes to the keyboard Special Function Keys (**SFK**) **[F2]** to **[F9]** and **[F11]** to **[F12]**.

The **[F1] SFK** is always reserved for accessing the **SURPAC Help** Pages. The **[F10] SFK** is a pre-assigned Key and cannot be used for programme allocation.

Allocating a **SURPAC** Programme to a **SFK** means that that Programme can be loaded and run by simply pressing the appropriate keyboard **SFK**. For programmes that are often used, this method is a quicker alternative than having to go through the Menu system to locate and run the Programme.

Using this Programme you can set up your own preference list of Programmes that you want to allocate to the **SFK**s. This list will be stored in a file called "**F-Key Allocation**", which is maintained in the Folder in which **SURPAC** is installed. Deleting this file will set the **SFK** allocation back to its default allocation.

The [F5] SFK

Allocating a Programme to the **[F5] SFK** can cause a problem, as this **SFK** may be used by some of **SURPAC** programmes as an "Entry of Data completed " function in an **Edit Window** . If the **[F5] SFK** "Entry of Data completed " function is enabled for a Programme, then allocating a Programme to **[F5]** can cause certain programmes to ignore the Programme call when the **[F5] SFK** is pressed.

To avoid the above conflict in the use of the **[F5] SFK**, there is a Check Box on the Form which allows the **[F5] SFK** "Entry of Data completed " function to be disabled. If you intend allocating a Programme to the **[F5] SFK** then it is advisable to make sure that this Check Box is checked.

Using CAD Programmes

The **SFK** Programme allocations will not work when running any of the **SURPAC CAD** Programmes, with the exception of the **DTM** Programme. This is because the **CAD** Programmes have their own, internal usage for the **SFK**s.

Programme Operation

From the "**File**" Main Menu heading, select the "**Set the Function Key Allocations**" menu item. The programme Form will then be displayed.

The Form consists of :-

A list of the 12 **SFK**s on the left hand side of the Form, with the current **SFK** allocation for each of the keys shown in a list of Text boxes. The **[F2] SFK** will be highlighted in red, indication that is the default **SFK** for editing.

On the right hand side of the Form is a **Programme List** that shows all the Programmes that may be linked, or allocated, to an **SFK**. A line trace will show the current **SFK - Programme** link.

To change an **SFK** allocation, click either the **SFK** button, or the Text box containing the current Programme allocation. Both the **SFK** Button and its associated Text Box will be displayed in red, and line trace will change to show where the selected Programme is in the **Programme List**.

If you want to use the **[F5] SFK** for access top an allocated Programme, then make sure that the appropriate **Check Box** at the bottom of the Form is checked.

Once all required **SFK** allocations have been made, click the **[Save Layout]** Button.

When operating in **SURPAC** (except in any of the **CAD** programmes), you can now access the allocated Programmes, at any time, by pressing the assigned **SFK**.

Note :

Avoid pressing the **[F10] SFK**. This key cannot be allocated and, if pressed will cause the **SFK** allocation facility to be temporarily "frozen". If you do happen to press the **[F10]** key by mistake, however, then just press **[F10]** again and this will "unfreeze" the **SFK** allocation facility.

2. Locate and Mean Point Groups in a Co-ordinate File

Programme Description

A **Point Group** is defined as two, or more, Points in a **Co-ordinate File** that lie within a prescribed distance of one another. The programme will search through the current **Co-ordinate File**, using an alphanumeric order, looking for Points that create a **Point Group**. A **Point Group** can be from 2 to 14 Points in size.

This programme incorporates a number of useful functions. For example :-

- It can be used to search for and **Display** the Values of a Point that may have been surveyed two, or more, times and Saved in the Co-ordinate File under different Names.
- It can be used to **Mean** all the Points in a **Point Group** and then save these meaned values in the **Co-ordinate File** , using a default Name or a User entered Name.
- It can be used to **Adopt** either the first, or the second located Point in a **Point Group** and then save this Point's values in the **Co-ordinate File** , using a default Name or a User entered Name.
- It can be used to **Delete** all Points in a **Point Group**, other than the Point selected as the required Point representing the **Point Group**.

Programme Operation

From the "**Conversion**" Main Menu heading, select the "**Locate and Mean Point Groups in a File**" menu item. The programme Form will then be displayed.

The Form consists of :-

Input Boxes forming an **Edit Window** at the top of the Form, used for Displaying and/or Editing the Co-ordinate values of the **Selected Point**. The **Selected Point** is the Point that will be Saved in the **Co-ordinate File** (unless the Save request is turned off), as representing the **Point Group**. These values may be User modified.

A **File Display Window** that will display the Point Names, Co-ordinates, Heights, Directions and Distances of all Points located as a **Point Group**. The Directions and Distances displayed for each Point are values calculated from the current co-ordinates displayed for the **Selected Point**. As the **Selected Point** co-ordinates change (either by direct User Editing, or by changing the **Group Point** information), so the Directions and Distances in the display will change.

At the right hand side of the **File display Window** is a graphic (a **Tick** or a **Cross**) showing which of the **Point Group** Points have been used in determining the initial, default values of the **Selected Point**. Clicking a **Line** in the **File Display Window** will change that Point's status from **Used** to **Not Used**, or vice versa. If the Primary Point is selected as the default for the **Selected Point** (see Options below) for example, then that Point will have a **Tick** graphic (the Point is **Used**) and all other Points will have a **Cross** graphic (the Point is **Not Used**).

An **Input Box** below the **File Display window** that allows for the changing of the **Search Limit**.

Below this are a number of **Options** that allow the programme to be used for different requirements.

Programme Options

- You can select whether the **Primary Point**, is to be the **first** Point located in a **Point Group**, or the **second** located Point. If you want the programme to set the **Selected Point** values to be those of the **Primary Point** (as opposed to taking the Mean values of the whole **Point Group**), then this option allows you to set which of the first two Points found is to be the **Primary Point**.

For example, imagine set of Points were surveyed using **GPS** and were allocated numeric Names. Later, these same Points were re-surveyed by **Total Station** and were allocated Alphanumeric Names. If you now wanted to keep all the **Total Station** derived values, and display and/or delete those values determined by **GPS**, it would be necessary to set the **Primary Point** as the **2nd Located Point** as the numeric Names would always be located first.

- You can make the programme initially set the **Selected Point** to the values of the **Primary Point**, or to the **Mean** of all Points in the **Point Group**.

- You can have the programme work in "**Automatic**" mode, or "**Manual**" mode.

Using the "Auto-Locate" or Automatic Mode

Once the **[Start Searching the File]** Button is clicked, the **Automatic** mode (**Auto-Locate, Process and Display all Existing Point Groups**) will cause the programme to compute all **Point Groups**, determine the **Selected Point** for each **Point Group** (based on the current **Option** settings and **Search Radius**), **Save** the **Selected Points** (if requested), **Delete** other **Point Group** Points (if requested) and finally, to display the results of the Search. At this stage a **Print out** of these results can be done, if required.

While this method is obviously a lot faster than using the Manual method, it does not allow for User intervention, other than the setting up of the required **Options** before the File Searching function is started.

Using the "Display and wait" or Manual Mode

In the **Manual** mode (**Display one Group at a time, and then wait for User Activity**), clicking the **[Start Searching the File]** Button will cause the programme to Locate and display all Points on the first **Point Group** and then wait. The values displayed for the **Selected Point** will depend on the **Option** chosen for the initial default values (either the **Primary Point's** values, or the **Point Group** mean values). These values of the **Selected Point** may be changed by either clicking a **Line** in the **File Display Window**, thereby changing a Point from **Used** to **Not Used**, or vice versa, or by entering User required values into any of the **Input Boxes** in the **Edit Window**.

Clicking the **[Display the Next Group]** Button will then cause the programme to calculate and display the next **Point Group**. Once all groups have been located and the File Search completed, the programme will display the results of the Search. At this stage a **Print out** of these results can be done, if required.

While this method is slower than using the Automatic method, it does allow for User intervention, and **Selected Point** modification for any **Point Group**.

Modified SURPAC Programmes in Version 5.04, Release 01

Contour Generating and Plotting Programme

1. Fit Triangles to BreakLines

The constructed **Triangles** can be modified such that **Triangle** base lines are made co-incident with **BreakLine** segments. In order for this to be feasible, it is important the **BreakLines** are constructed so that they run "Point to Point". Any **BreakLine** segment drawn between Points that are far apart can not be matched to a **Triangle** base. In this case, the segment will be ignored and matching will have to be done manually (using the **Modify a Triangle** Command). Using this function with correctly constructed **BreakLines** can vastly improve the **Triangulation** network, aligning the network so that known, and highlighted topographical features are correctly shown by the **Triangle** generated **contours**.

On completion of the **Triangulation** (using either the **Generate New Triangulation** Command, or the **Create New Contours** Command), the programme will check to see if any **BreakLines** exist for the current **Tacheometric** File. If so, then the porgramme will automatically run the "**Fit Triangles to BreakLines**" function.

Using this Command, the **Triangulation** may be modified at any time, however, if a **BreakLine**, or a series of **BreakLines** are modified or added subsequent to generating the **Triangulation**.

2. Create a "Civil Designer DAT" File

This option allows you to create an **ASCII** file in the "**Civil Designer DAT**" format. This is done by combining **SURPAC Tacheometric** File co-ordinate information with a related **SURPAC Surface Triangulation** file. The **Surface Triangulation** for the current Sheet must obviously exist before this option can be used.

Basically, a **DAT** file is an **ASCII** file that contains the following, comma separated information, on each line :-

- A Point's **Description** (or null),
- A Point's **[Y, X, Z]** co-ordinates,
- A Point's **Layer Number**, (**SURPAC** defaults this to Layer 1)
- Up to **8** Point "Numbers" that are linked to the current Point in the **Surface Triangulation** Network.

Note that the **DAT** format makes no allowance for the actual Name, or Number of a Point. The Point "Number" that is allocated is the File line number on which the Point's information (Description and co-ordinates) appear. This means that when you create a **DAT** file using this Command, the Point Numbers that are generated from the **DAT** file will not necessarily be the same as those in the **SURPAC** Tacheometric file.

Contour Generating and Plotting Programme

1. Importing from a Civil Designer DAT File (via the [Options] Button)

Using the normal **File Selection Window**, select the **DAT** File required. The programme will automatically create the **Tacheometric File** information. Point Numbers will be started from 0001 for a new file, or from the last existing Point Number for an existing File. Point Numbers will then be incremented by 1, for each new Point.

On the completion of the Point creation from the **DAT** file, the programme will prompt :-
"**Do you want to Generate a Surface Contour Triangulation File from the Imported Data?**"
Click the "**Yes**" Button if you want a **Surface Triangulation** file generated.

The appended Points from the **DAT** file will now be visible in the **Tacheometric File Display Window**.

In order to view the **Surface Triangulation**, run the **Tacheometric and Contour Plotting C.A.D.** Programme. If the triangulation network is not displayed automatically, then click the "**Triangulation Display On/Off**" Button in the **Floating Tool Bar**.

If you want to generate **Contours** from the **Surface Triangulation**, then click the "**Create Contours**" Button in the **Floating Tool Bar**. When the prompt

"**Triangles for this File already Exist – Do you want to re-Create these Triangles?**" appears, click the "**No**" Button. Contours will now generated, at the required interval, using the **Surface Triangulation** imported from the **DAT** file.

"Debugging" and small programme changes made in Version 5.04, Release 01

- The maximum number of Placing/Checking Points per Set-Up when generating **Setting Out Sheets** has been increased from **300** to **1000**.
- Creating **BreakLines** in the **Contour Creation and Plotting** Programme has been improved and speeded up. The maximum number of **BreakLines** per Sheet is 200, and the maximum number of Points per **BreakLine** is also 200.
- The **Printing** of the **Observation Abstract Sheet** for the **Single Point Least Squares** Programme has been enabled.
- The problem associated with using a long file name (in excess of 16 characters) in the **Least Squares Level Network Adjustment** Programme has been rectified.
- The "**Raw Data**" **Printing** of an **Observation file** now makes allowances for extended Header information and angular and linear accuracy options.
- When **Merging Selected Points** from another **Co-ordinate file**, it is now possible to select the required Points from a displayed list (by "clicking" them), instead of entering the names manually.

- In the **Digital Terrain Modelling** Programme, the **Grid Mesh 3D DTM Plotter** Output now uses the assigned **Line Colours** (as in the Screen display), and does not plot in Monochrome as it did in the past.
- In the **Least Squares Single Point Fix** Programme, the initial Information Form will display a list of all Set Up Points (for Resections), or Forward Observed Control Points (for Intersections) found in the currently defined Observation File, and allow you to select the required Point.

Modifications made to SURPAC Version 5.04, Release 03

1. Reducing of Observation Files

When reducing **Observation Files**, it is now possible to **limit** the calculation process to a User defined portion of the **Observation File**. You may now enter the **Start** and **End** line numbers to restrict the programme to those lies only. Obviously, at least one Set Up must be included in the range of Lines selected.

This new feature applies to both reductions to a **Tacheometric** File and the **Co-ordinate** File.

2. Keeping Spot Heights and Mark Points at Constant Size

This new feature applies to the Contour Creation/Plotting Programme **and the** C.A.D. Drawing & Plotting **Programme.**

By default, the size of both Spot Heights **and/or** Mark Points **will be held at a** Constant Size**. The following provisos and options are applicable :-**

- The **Constant Size** will be the User defined default **Data Character Size** (in mm). This character size may be altered, either through the Sheet's **Set Up Information Form**, or via the "**Set Display Options ….**" Menu Item.
- The **Constant Size** function is only applied by the Programmes when the Sheet Display Scale is larger, or equal to, the User defined Final Plotting Scale. This is to prevent the Display being covered by relatively huge numbers when a small Display Scale is used.
- You can cancel the **Constant Size** function by clicking the appropriate Check Box, after selecting the "**Set Display Options ….**" Menu Item.

3. Changing the Size, Outline Colour and Background Colour of Mark Points

This new feature applies to the C.A.D. Drawing & Plotting **Programme.**

Existing Mark Points (Circles, Squares, triangles etc.) may have their Size**,** Outline **(**Drawing**)** Colour **and** Background colour **changed via the "**Set Display Options ….**" Menu Item, found under either the** Mark Pnt **or** Point **Main Menu items.**

The Size **and** Colour **of existing** Point Names **may also be changed, using this same option.**

4. Zoom to a Window, Zoom to Full Sheet and Zoom to Plot Scale

This new feature applies to All **the** SURPAC C.A.D. **Programmes.**

Users can now employ these three new Commands to improve on-screen Scale changing, and to locate on-screen positions. With the pre-existing Zoom Up **and** Zoom Down **Commands, the full list of** Zoom **Commands is now :-**

[Pg Up] – Zoom Display Scale Up

Selecting this Command from the **General** (or **F-Key**) Main Menu, or pressing the **[Pg Up]** keyboard key, will cause the Screen display to be re-plotted at **half** the current display Scale. For example, if the current Screen display Scale is 1 : 1000, the new Scale will become 1 : 500.

[Pg Dn] – Zoom Display Scale Down

Selecting this Command from the **General** (or **F-Key**) Main Menu, or pressing the **[Pg Dn]** keyboard key, will cause the Screen display to be re-plotted at **twice** the current display Scale. For example, if the current Screen display Scale is 1 : 1000, the new Scale will become 1 : 2000.

[Insert] – Zoom to a User Defined Window

Selecting this Command from the **General** (or **F-Key**) Main Menu, or pressing the **[Insert]** keyboard key, will enable you to define a **Zoom Window** on the current Screen display, that will be used to define both a new Screen display **Position** and a display **Scale**.

Once this Command has been given, move the Cursor to the Top Left position of the required **Zoom Window** and click the Mouse **[LHB]**. As the mouse is moved (down and to the right), a purple rectangle will be displayed, following the Cursor position.

Note that the shape of the rectangle (**Zoom Window**) may not be changed, only its size. The shape is defined by the current Sheet width and height parameters.

When the **Zoom Window** is of the required size, click either the Mouse **[LHB]** or **[RHB]**. The Screen display will be re-plotted, being centered and Scaled by the defined **Zoom Window**.

[Home] – Zoom to the Full Sheet Scale

Selecting this Command from the **General** (or **F-Key**) Main Menu, or pressing the **[Home]** keyboard key, will cause the Screen display to be re-plotted at a Scale that allows for the entire Sheet to be displayed on the Screen.

This is a useful Command when used in conjunction with the **[Insert] – Zoom to a Window** Command (see above). For example, if your current Screen display is at a relatively large scale and you now want to move to new position which is a long way from the current position, then use the **[Home]-Zoom to Full Sheet** Command to display the entire Sheet on the Screen then use the **[Insert] – Zoom to a Window** Command to define a **Zoom Window** covering the required new location.

[End] – Zoom to the Sheet Plot Scale

Selecting this Command from the **General** (or **F-Key**) Main Menu, or pressing the **[End]** keyboard key, will cause the Screen display to be re-plotted at a Scale that allows for the entire Sheet to be displayed on the Screen.

This is a useful Command when you need to see how the Sheet layout appears at the defined Plotting Scale.

Appropriate Icons have been included in the various Menu Bars to enable quick access to these **Zoom** Commands. The relevant Keyboard alternatives ([Insert], [Home] etc.) also provide quick access.

5. Data downloading from the Sokkia SDL30 *Power Level*

Electronic Line levelling data, captured on the **Sokkia SDL30** ***Power Level***, may now be downloaded directly into **SURPAC**, via the **Level Observation File Load/Edit** Programme.

When in **the Level Observation File Load/Edit** Programme, click the **[Load Data]** Button, and select the **Sokkia SDL30** ***Power Level*** option.

Refer to the appropriate **SURPAC** Help Pages for detailed information on using the **Sokkia SDL30** ***Power Level*** when downloading into **SURPAC**.

My thanks to Mr. Lourens Van Vuuren and **Sokkia RSA** for the loan of the necessary equipment to make this new addition possible.

6. Creating Insets in Cadastral Programmes

This new feature applies to the **General Plan**, **Working Plan**, **Sectional Title Plan** and **Diagram** Programmes**.**

The **Frame** Commands can now be used to create Insets more easily, as they now allow for the Copying of **Points**, as well as **Lines** and **Text**.

When **Points** are included in a **Frame Definition** (which is optional), such **Points** will be replicated in the new, Copied display as **Inset Points**. They will retain the same Name and Name Position as the original

Points . Although they may be Viewed, Modified and/or Deleted on the Sheet onto which the **Frame** is Copied, they do not appear on the Co-ordinate List, or Co-ordinate Editing Programme as extra Points. They are regarded as “pseudo-Points” that exist only for the purpose of showing Copied Points in an Inset.

Note that a group of Inset Points may be Deleted by means of generating an appropriate Erasure Polygon.

7. General Changes made to various Programmes in Version 5.04, Release 03

- The **Vertical Curve Alignment** Programme has been amended to allow for separate Formation criteria to applied to User defined sections, or runs, within the entire file.

- When loading any of the **Cadastral C.A.D.** Programmes, the last used Sheet (**GP**, **WP** or **ST**) will be loaded as the default Sheet. In the past, the first available Sheet was always loaded as the default.

- **The Locate and Mean Point Groups in a File** Programme has been modified so as to allow the resultant differences be displayed as either **Polar data** or as **Co-ordinate differences**.

- When creating a **Printout** of **a Co-ordinate List** (or a **Peg file**), it is now possible to define an “**Exclusion**” text item. This Exclusion text item may be up to 7 characters in length. Any Point in the Co-ordinate file whose Name begins with the defined Exclusion text item will be excluded from the listing. Leave the Exclusion text item as blank if you do not want to exclude any Points.

Modifications made to SURPAC Version 5.05, Release 01

SURPAC non-Graphic Programmes

Additions and Modification applicable to All SURPAC non-Graphic Programmes

(NB : The Additions and Modifications made to the Graphic Programmes are listed further on.)

1. The Irish Grid, the U.K. National Grid and the ETRS89 Co-ordinate Systems

These three **Co-ordinate Reference Systems** (or **TRFs** – **Terrestrial Reference Systems**) have been added in order to provide support for **SURPAC** Users living in the **U.K**. or **Ireland**.
The other **Co-ordinate Reference System** supported in this region is the **Universal Transverse Mercator** (**U.T.M.**) System (**Zones 29**, **30** and **31**).

The Irish Grid

This **Co-ordinate Reference System** is defined by the following parameters :-

- **Ellipsoid : Airy 1830 Modified**
  : a = 6 377 340.189 m
  : b = 6 356 034.447 m

- **True Origin : Latitude 53°30' 00" N**
  : Longitude 8°00' 00" W

- **False Origin : 200 kms West of True Origin**
  : 250 kms South of True Origin

- **Co-ordinates : Easting = + 200 000.000 m**
- **of True Origin : Northing = + 250 000.000 m**

- **Scale Factor : 1.000035 (on Central Meridian 8°We st)**
- **Projection : Transverse Mercator**
- **Unit : International metre**
- **Ordinates : Eastings, Northings (E, N)**

- **Heighting : MSL Orthometric Heights based on**
  System : Malin Head Vertical Datum

Transformation functions using the "**Irish Grid/U.T.M. Transformations**" menu item (found under the "**Conversions**" main menu) include :-

- **Geographical (Longitude, Latitude) to Irish Grid (Eastings, Northings)**
- **Irish Grid (Eastings, Northings) to Geographical (Longitude, Latitude)**
- **Irish Grid (Eastings, Northings) to U.T.M. (Eastings, Northings)**

Further routines to convert to, or from, **ASCII** files and various **Total Station/Loggers** also exist. These routines may be found by selecting the **[Options]** button, when running the **Co-ordinate File Editing** Programme.

Finally, two Programmes have been added which provide for converting **Irish Grid** values to and from the **Irish Local Grid System**. These two Programmes may be found by selecting either the **"Irish Grid to Local System**" or "**Local System to Irish Grid**" menu items (found under the "**Conversions**" main menu).

The U.K. National Grid (OSGB36 and ODN)

This **Co-ordinate Reference System** is defined by the following parameters :-

- **Ellipsoid : Airy 1830**
  : a = 6 377 563.3964 m
  : b = 6 356 256.9096 m

- **True Origin : Latitude 49°00' 00" N**
  : Longitude 2°00' 00" W

- **False Origin : 400 kms West of True Origin**
  : 100 kms North of True Origin

- **Co-ordinates : Easting = + 400 000.000 m**
- **of True Origin : Northing = - 100 000.000 m**

- **Scale Factor : 0.9996012717 (on Central Meridian 2°West)**
- **Projection : Transverse Mercator**
- **Unit : International metre**
- **Ordinates : Eastings, Northings (E, N)**

- **Heighting : MSL Orthometric Heights based on**
  System : Ordnance Datum Newlyn (ODN)

Transformation functions using the "**National Grid/U.T.M. Transformations**" menu item (found under the "**Conversions**" main menu) include :-

- **Geographical (Airy 1830 - Longitude, Latitude) to National Grid (Eastings, Northings)**
- **Geographical (WGS84 - Longitude, Latitude) to National Grid (Eastings, Northings)**
- **National Grid (Eastings, Northings) to Geographical (Airy 1830 - Longitude, Latitude)**
- **National Grid (Eastings, Northings) to Geographical (WS84 (ETRS89) - Longitude, Latitude)**
- **ETRS89 (WGS84 - Eastings, Northings) to National Grid (Eastings, Northings)**
- **National Grid (Eastings, Northings) to U.T.M. (Eastings, Northings)**

OSTN97 and OSGM91 Compatibility : The National Grid to ETRS89 and the ETRS89 to National Grid conversions use algorithms and shift data provided by the U.K. Ordnance Survey, and are fully OSTN97 and OSGM91 enabled. In order to use these transformations, however, the files called "OSTN97.DAT" (for Eastings, Northings) and "OSGM91.DAT" (for heights) must exist in the SURPAC application folder. If not, they may be downloaded from the SURPAC Internet site www.surpac.co.za .

Further routines to convert to, or from, **ASCII** files and various **Total Station/Loggers** also exist. These routines may be found by selecting the **[Options]** button, when running the **Co-ordinate File Editing** Programme.

ETRS89 - European Terrestrial Reference System 1989 (National GPS Network)

This **Co-ordinate Reference System** is fundamentally the **WGS84 epoch 1989.0** system, and is also referred to in the **U.K.** as the **National GPS Network**.

*For clarity, it should be noted that **ETRS89** system differs to the **ITRS** (**International Terrestrial Reference System**) to the order of 0.30 m in the **U.K**. The two systems were identical at the 1989.0 epoch, but are moving apart (due to tectonic plate movements) at a rate of approximately .025 m per annum.*

This **Co-ordinate Reference System** (for the **U.K.**) is defined by the following parameters :-

- **Ellipsoid : WGS84 (aka GRS80)**
  : a = 6 378 137.0000 m

: **b = 6 356 752.3141 m**

- **True Origin** : **Latitude 49°00' 00" N**
  : **Longitude 2°00' 00" W**

- **False Origin** : **400 kms West of True Origin**
  : **100 kms North of True Origin**

- **Co-ordinates** : **Easting = + 400 000.000 m**
- **of True Origin** : **Northing = - 100 000.000 m**

- **Scale Factor** : **0.9996012717 (on Central Meridian 2°West)**
- **Projection** : **Transverse Mercator**
- **Unit** : **International metre**
- **Ordinates** : **Eastings, Northings (E, N)**

- **Heighting System** : **Ellipsoidal Heights**
  :

Transformation functions using the "**ETRS89/U.T.M. Transformations**" menu item (found under the "**Conversions**" main menu) include :-

- **Geographical (WGS84 - Longitude, Latitude) to ETRS89 (Eastings, Northings)**
- **ETRS89 (Eastings, Northings) to Geographical (WGS84 - Longitude, Latitude)**
- **National Grid(Airy 1830 - Eastings, Northings) to ETRS89 (Eastings, Northings)**
- **ETRS89 (Eastings, Northings) to U.T.M. (Eastings, Northings)**

OSTN97 and OSGM91 Compatibility : The National Grid to ETRS89 and the ETRS89 to National Grid conversions use algorithms and shift data provided by the U.K. Ordnance Survey, and are fully OSTN97 and OSGM91 enabled. In order to use these transformations, however, the files called "OSTN97.DAT" (for Eastings, Northings) and "OSGM91.DAT" (for heights) must exist in the SURPAC application folder. If not, they may be downloaded from the SURPAC Internet site www.surpac.co.za .

Further routines to convert to, or from, **ASCII** files and various **Total Station/Loggers** also exist. These routines may be found by selecting the **[Options]** button, when running the **Co-ordinate File Editing** Programme

2. Using a 1000's Separator when displaying Co-ordinates and Distances

The display of **Co-ordinate** and **Distance** values may now be modified by selecting a **Separator Character** to be inserted between the "thousands" value and the "hundreds" value, and between the "millions" value and the "hundred thousands" value of a number (Co-ordinate or Distance)

To set a required **separator**, you need to display the "**Set Co-ordinate File and DataBase Information**" form. To display this form, either :-

- Select the "**Reset Co-ordinate File System**" item from the "**File**" main menu, or
- When in the "**Co-ordinate File Editing**" Programme, click the **[System Set]** Button, or
- When in the "**Co-ordinate File Editing**" Programme, click the Mouse Right Button and select the "**Set/Check the Current File System**" item from the displayed "pop-up" menu.

Once the form is displayed, click the down arrow on the "**1000's Separator**" List Box and then click either **Space**, **Point**, **Comma** or **None** for the required separator.

Notes :

- you cannot set the **Separator** to be the same character as that defined as the **Decimal Indicator**.
- The **Separator** allocated to existing (prior to the installation of **SURPAC Version 5.05**) Co-ordinate Files is **None**.
- The **Separator** allocated to a new Co-ordinate Files will default to the same **Separator** as that used for the last Co-ordinate File opened.

Examples of allowable numeric display formats are :-

2 845 355.234
2 845 355,234
2.845.355,234
2,845,355.234
2845355.234
2845355,234

3. Point Off-Line Calculations – new Least Squares "Line of Best Fit" Option

This programme has been extended and now offers the Option of locating the "**Line of Best Fit**" through all located Points.

Using this Option, once a required reference line has been defined by means of its two terminals, the programme will locate all Points falling within the User defined distance (or angular) tolerance from that line. The **Least Squares Line of Best Fit** will then be calculated, giving equal weight to all Points located, including the two terminals.

The **Off-Set** and **Position** (left or right looking from the first terminal) for each Point from this **Line of Best Fit** will then be displayed.

You may then **Move** the located **Points** On-Line (i.e. onto the **Line of Best Fit**). This will change the co-ordinates of the Located Points to their on-line computed values. Otherwise, you may compute **New Points**. These New Points will have the on-line values of the located Points, but will be given different (but associated) Names. The original located Points will not be changed.

4. Observation File Editing Programme – new "Active/Non-Active" function

The **Observation File Editing** Programme now includes an "**Obs Active**" column which is applicable to all data lines in a displayed Observation File.

An Observation that is defined as **Active** is available for use by any applicable **SURPAC** Programme. An **Active** Observation will have a **Green Tick** displayed in its "**Obs Active**" column.
An Observation that is defined as **Non-Active** is an Observation that still exists in the Observation File, but which is currently not available for use by any of the **SURPAC** Programmes. A **Non-Active** Observation will have a **Red Cross** displayed in its "**Obs Active**" column, and the Observation information will be displayed in **Red Italic** text.

An Observations **Active** status can be changed using a single mouse click.

For all new Observation Files, and for all Observation Files existing before the installation of **SURPAC Version 5.05**, all Observations will be shown as being **Active**. This is indicated by a **Green Tick** in the "**Obs Active**" column.

To change an Observation's **Active** status, click the **Mouse [LHB]** in the column marked "**Obs Active**" in the appropriate display Line.

If the Observation clicked is a **Set Up Point**, all Observations made **TO** and **FROM** that **Point** will have its **Active** status changed.

Under the **[Options]** button will be found an Option which queries whether all Observations made to that same Point (if others exist) should also have their **Active** status changed. If not required, this Option can be disabled. However, in large Networks where multiple arcs are observed, it is advisable to leave this Option enabled.

5. Least Squares Single Point Fix Programmes – new "Active/Non-Active" function

The **Least Squares Single Point Fix Programmes** now include an "**Active**" column which is applicable to all data lines displayed for a Single Point Fix calculation.

A Data Line that is defined as **Active** is available will be used in the calculation of the defined unknown (free) Point. An **Active** Data Line will have a **Green Tick** displayed in its "**Active**" column.

A Data Line defined as **Non-Active** is data that exists, but which will not be used for the current calculation. A **Non**-**Active** Data Line will have a **Red Cross** displayed in its "**Active**" column, and the Observation information will be displayed in **Red Italic** text.

An Observations **Active** status can be changed using a single mouse click.

To change a Data Line's **Active** status, click the **Mouse [LHB]** in the column marked "**Active**" in the appropriate display Line.

6. Systems for Botswana, Lesotho, Namibia, Swaziland and Zimbabwe

Users in these countries may now set their localized **Lo System** (the **Bessel's System** for **Namibia**) as the current system. A small **flag** at the top left of the display in the **Co-ordinate File Editing** Programme will indicate the current System in use. Apart from the flags for these countries, the **South African** flag will indicate either the **RSA Lo System** or the **RSA WG System**, the **Irish** flag the **Irish Grid**, the **Union Jack** either the **U.K. National Grid**, or the **National GPS Grid**, and an appropriate **U.T.M.** flag will indicate the use of that system. **Local Systems** have no flag set.

7. Changing to another Co-ordinate, Observation or Tacheometric File

In order to switch to a different **Co-ordinate**, **Observation** or **Tacheometric** File, do a **Mouse [RHB]** click, when running the appropriate Editing Programme.

For **Co-ordinate Files**, a Pop-Up menu will appear with the two top menu items being the options to **Open or Create a Co-ordinate File** and to run the **C.A.D. Drawing & Plotting Programme**.

For **Observation** and **Tacheometric Files**, the appropriate File selection form will be displayed when the **Mouse [RHB]** is clicked.

SURPAC Graphic Programmes

Additions and Modification applicable to All SURPAC Graphic Programmes

The following Additions and/or Modifications apply to the following SURPAC Programmes :-

- **C.A.D. Drawing & Plotting Programme**
- **Contour Creation/Plotting C.A.D. (except for the individual Text Item Font function)**
- **General Plan Construct/Edit**
- **Data Sheet Construct/Edit**
- **Diagram Construct/Edit**
- **Sectional Title Plans**
- **Working Plan Construct/Edit**
- **Digital Terrain Model Creation/Display (Only for the Mouse Panning function)**

1. Setting the Pen Line Thicknesses

This function allows you to view, or to allocate required **Pen Line Thicknesses** for each of the available **8 Pens**, used in the **SURPAC** Graphic Programmes.

When **SURPAC** is installed, the **Line Thicknesses** are set to their default values, as follows :-

Pen 1 Line Thickness = 0.20 mm
Pen 2 Line Thickness = 0.30 mm
Pen 3 Line Thickness = 0.50 mm
Pen 4 Line Thickness = 0.75 mm

Pen 5 Line Thickness = 1.00 mm
Pen 6 Line Thickness = 1.50 mm
Pen 7 Line Thickness = 2.00 mm
Pen 8 Line Thickness = 3.00 mm

Any, or all of these default values may be changed by selecting the "**Change the Pen Thickness Values**" menu item, found under the "**Edit**" menu heading.

Notes on Pen Line Thicknesses

The **thickness** value allocated to any **Pen**, should produce a Line on the **Printer/Plotter** output of the same width (or thickness). The first time you use any **Printer/Plotter** however, you should plot a test sample using all the Pens, and then measure the resultant **Line Thicknesses** to ensure that they are correct. If not, you may have to set **Thicknesses** for the Pens that will produce the desired **Thicknesses** on the **Printer/Plotter** output.

The **Screen Line Thicknesses** will emulate the set **Pen Thicknesses** as closely as is possible, bearing in mind that the Screen resolution is much lower than that of a Printer/Plotter device.

The values allocated to the **8 Pens** will be stored in a File, for future use.

Changing the **Pen Thicknesses** in any of the Graphic Programmes will cause the **Pen Thicknesses** for all Graphic Programmes to be modified.

Any **Lines** drawn before any **Pen Thickness** changes are made, will automatically have their **Thicknesses** changed in accordance to the new settings.

When the **Keep Line Thicknesses Constant** Check Box on the form is **Checked** (i.e. when a cross is displayed), the **Line Thicknesses** will be kept to their designated **Thicknesses** whenever the current Scale is larger than the designated Plotting Scale for that Sheet. For example, if Pen 2 is set to a thickness 0.50 mm, then as long as the current Scale is equal, or larger than the Plotting Scale, any Line drawn with a Pen 2 thickness will have its width maintained at 0.50 mm.

Leaving the **Keep Line Thicknesses Constant** Check Box **Unchecked** will cause Lines to be drawn at Thicknesses appropriate to the current Scale. For example, if Pen 2 is set to a thickness 0.50 mm, then if the current Scale is say 1:500 with a designated Plotting Scale of 1:1000, any Line drawn with a Pen 2 thickness will have its width shown as 1.00 mm.

Due to the limited accuracy of Screen displays (approximately 50-80 DPI) compared to Inkjet Printers/Plotters (from 300 – 2000 DPI), **Pen Line Thicknesses** shown on the Screen display are not always true reflections of the relative **Line Thicknesses**. For example, if Pen 1 is set to a thickness (width) of 0.20mm and Pen 2 is set to 0.3mm, lines drawn with the two may appear to have the same width on the Screen, especially when small scales are used.

2. Setting the Pen Style Pattern Lengths

This function allows you to view, or to allocate required **Pen Style Pattern Lengths** for each of the 4 non-solid **Line Styles**. Users can now customize each of these Line Styles by setting individual Pattern Lengths.

Any, or all of these default values may be changed by selecting the "**Set the Style Pattern Lengths**" menu item, found under the "**Edit**" menu heading.

3. Zooming and Panning using the Mouse

New **Zooming** and **Panning** options have been added. These options use the **Mouse** to control and define the **Zoom** and **Pan** options, without the necessity of pressing any keyboard keys. Once these Mouse operations have been mastered, **Zooming** and **Panning** a Screen display is much simpler and quicker than using the Scroll Bars or keyboard commands.

To Zoom the Screen display to show a defined rectangle at an enlarged Scale - Press and hold the **Mouse [RHB]** and then drag the cursor towards the right and/or downwards. A rectangle will be

displayed as the cursor is moved. Once the cursor is the required position, release the **Mouse [RHB]**. A new screen will then be displayed showing the area defined by the rectangle. (This is similar to the **[ZW]** – **Zoom Window** Command.)

To revert the Screen display to the previously used Scale - Press and hold the **Mouse [RHB]** and then drag the cursor to the left and/or upwards. After the cursor has been dragged a short way (about 5mm) the programme will automatically re-display the Screen at the previously used Scale. This function may be repeated for as many previous scales as have been used during the current session.

To Pan (move about) within the available Screen Display - Press and hold the **Mouse [LHB]** and then drag the cursor in the required direction. As the cursor is moved, the position of the Screen Display will change in response to the cursor movement. The Screen Display can be moved to any position within the limits of the Horizontal and Vertical Scroll Bars. Once the required location has been reached, release the **Mouse [LHB]**. Either the Horizontal, or the Vertical Scroll Bar position indicator (or both) will change in response to this **Panning** action.

4. Changes to the [F5] (Select new Screen Scale) Command

Pressing the **[F5]** Special Function Key (or the equivalent **[K]** key), now displays a more useful scale selection form. The form allows for either the entry of a required new Screen display scale, or the selection of the scale from a list of scales.

The top **Input Box** will display the current Screen scale, and allow you to enter a new scale. If you want to use this method (which is similar to the previous method) then enter the required new scale and then either press the **[Enter]** key, or click the **[OK]** button on the form. It is only necessary to enter the actual scale number (e.g. 500), not the whole item (e.g. 1 : 500).

The lower Selection list will highlight the scale value which is closest to the current Screen scale. From this selection list, move the Scroll Bar (if necessary) so that the required scale is visible, then simply click that value.

5. Using different Fonts for individual Text Items, plus other Text Options

Text Items can now be set to use a **Font** different from the defined **"Default Font**". The "**Default Font**" is that Font defined via the "**Sheet Setup Information**" menu item, or the "**Select Plot File Default Font**" menu item.

When selecting the "**Write Text Item**" Command (the **[WT]** Command), the displayed **Text Entry and/or Editing** form now includes :-

5.1 A List of all existing **Fonts**, from which the required Font for the current **Text Item** may be selected.

5.2 An option to change all characters in the current **Text Item** to **Lower Case**.

5.3 An option to change all characters in the current **Text Item** to **Upper Case**.

5.4 An option to set the current **Text Item** to **Double Spacing**.

5.5 An option to set, or remove, the **Underlining** of the current **Text Item**.

The other Options (**Text Colour**, **Direction**, **Size** etc.) remain as before.

NB : This Option does not apply to the **Contouring Creation/Plotting** Programme

Additions and Modification applicable to Individual SURPAC Graphic Programmes

2. Contouring Creation/Plotting C.A.D. Programme

1.1 Options using the (new) Triangulation Polygon functions

The new **Triangulation Polygon** Option consists of **4 functions**, namely :-

1.1.1 Deleting all existing Triangles lying within the defining Polygon,
1.1.2 Deleting all existing Points lying within the defining Polygon,
1.1.3 Merging (appending) Points from another Tacheometric file, that lie within the defining Polygon, and
1.1.4 Re-Triangulate the area covered by the defining Polygon.

These Options may be carried out individually, or simultaneously. It is possible, for example, to delete all Triangles and Points lying within a User defined Polygon, then merge Points from another file and re-Triangulate the **Polygon** area, all in a single operation.

Defining the Polygon and required Options : The apices of the **Polygon** must be existing Points. The programme will not let you define a **Polygon** Point unless it is able to "snap" onto an existing Point. From the "**Triangulation**" menu, select the "**Triangulation Polygon Functions …**" item. From the displayed Option form, select the required Options. Note that some Options are linked.

For example, the programme will not let you delete the existing **Polygon** Points without deleting the Triangulation associated with those Points.

Move the cursor close to the required First Point of the **Polygon** and click the **Mouse [LHB]**. Now move from Point to Point along the perimeter of the required **Polygon**, clicking on each Point with the **Mouse [MB]**. Finally, when the Last Point is reached, indicate this by clicking the **Mouse [RHB]**. For the best results, the **Polygon** perimeter lines should coincide with existing Triangulation lines.

Deleting Triangles : In order for a Triangle to be Deleted, all three sides must either lie inside the **Polygon**, or be contiguous with one or more **Polygon** perimeter lines.

Deleting Points : In order for a Point to be Deleted, it must lie inside the **Polygon**. **Polygon** perimeter Points will **not** be deleted.

Merging Points : The programme will prompt for the name of the **Tacheometric** file from which the Points are to be Merged. Any Points from this file that lie inside (not on the perimeter) of the **Polygon** will be Merged. (Be careful of any Constant differences that may exist between the two Tacheometric files, as this will prevent Merging).

Re-Triangulating a Polygon : Re-Triangulation of the **Polygon** area can be carried out using the pre-existing Points (unless they have been Deleted), or on the Merged Points, or if applicable, on both sets of Points.

1.2 Disabling and Re-enabling BreakLine Segments

Any **BreakLine** Segments may now be **Disabled** and/or **Re-enabled**. A **BreakLine** is composed of Line **Segments** connecting Points having a common Description. A **BreakLine** can either be created using the **Auto BreakLine** function, or constructing it by using a Point by Point identification on the Screen. After an **Auto BreakLine** creation, it is possible that one or more of the **BreakLine Segments** are not required. This can happen, for example, if there are two separate topographical features each having Points with the description "TB" (Top of Bank) to identify the features. Using **Auto BreakLine** and defining the common description as "BL" would cause these two feature to be linked by the **BreakLine**, when obviously they should not be. By

disabling the unwanted **BreakLine Segment(s)**, the two features can be made as separate entities without having to use different descriptions for each feature.

To Disable a BreakLine Segment :

a. Move the cursor close to the required segment, then click the **Mouse [RHB]**. From the "**BreakLines**" menu, select the **"Disable a BreakLine Segment**" item, or,
b. Move the cursor close to the required segment, then give the Keyboard Command **[X]** (i.e. press the "**X**" key on the Keyboard).

To Restore (Re-enable) the Last Disabled Segment : Select the "**Restore Last Disabled Segment**" item from the **"BreakLines"** menu**.** Repeated use of this Command will **Restore** a series of previously **Disabled Segments**.

To Restore (Re-enable)all Disabled Segments : Select the **"Restore All Disabled Segments"** item from the **" BreakLines"** menu.

3. The General C.A.D. Plotting Programme

2.1 Dynamic Display of Latitude and Longitude values

The **Geographical** values (**Latitude** and **Longitude**) of any **Point**, **Line Terminal** or the current **Cursor** position can now be displayed in dynamic mode. Once this option is selected (from the "**General**" menu) the **Latitude** and **Longitude** will be shown in the display line at the top of the screen (just below the menus). The current **Co-ordinate File** must be set as a recognisable **Grid** system, linked to one of the available **Spheroids** (e.g. **RSA Lo** System, **RSA WG** System, **UTM** System, **Irish Grid** System, **UK National Grid** system etc.).

2.2 Sheet Setup Information changes

When using the "**Plot File Sheet Setup Information**" Option (from the "**File**" menu), the following Options are now available :-

2.2.1 Define a required **Horizontal Alignment** File to be included in the Sheet display

2.2.2 Define a required **Surface Contour** File to be included in the Sheet display

2.2.3 Define a required **Surface DTM** File to be included in the Sheet display. This will allow for the display of the Cursor **Height** value, plus the ability to use Commands such as the "**Height Lines from DTM**" Command.

2.2.4 When starting a **New Sheet**, options exist to select required **Default Point Name Position** and **Default Mark Point Type**.
A further Option exists that allows for the automatic allocation of the appropriate "**Working Plan**" **Mark Point Symbols** to the Points displayed on the Sheet. (This only applies for **Co-ordinate Files** using the **Cadastral** Format.)

2.3 Heighting Lines from the defined DTM (Digital Terrain Model)

If a **DTM** File has been selected in the **Sheet Setup Information** function, and if this **DTM** covers a portion, or all of the current Plot Sheet, then you can select the "**Draw**" menu item "**Height Lines from DTM**".

This option will allocate **DTM** interpolated heights to **Line terminals** falling within the area covered by the defined **DTM** file. A further option exists that will restrict the Heighting to those **Line terminals** which have a null (zero) height value. I.e. **Line terminals** that are already Heighted will not be changed.

This option is handy if you want to view a **3D** display of the file by transferring it to a **CAD** application such as **TopoCAD** or **AutoCAD**. Further, when you use the "**Convert Line Terminals to Points**" Option (under the "**Point**" menu heading), the generated **Points** will be allocated the **Line terminal Height** values.

2.4 Heighting Points from the defined DTM (Digital Terrain Model)

If a **DTM** File has been selected in the **Sheet Setup Information** function, and if this **DTM** covers a portion, or all of the current Plot Sheet, then you can select the "**Point**" menu item "**Height Points from DTM**".

This option will allocate **DTM** interpolated heights to all **Points** falling within the area covered by the defined **DTM** file. A further option exists that will restrict the Heighting to those **Points** which have a null (zero) height value. I.e **Points** that are already Heighted will not be changed.

2.5 New Image Commands (for the General C.A.D. Plotting Programme)

2.5.1 Transforming a Sheet Image – [IT]

This Command is used for setting a Sheet **Image** (normally an **Image** displaying an orthogonal, plan view) in its correct Position and Size relative to the Survey System defined in the current Co-ordinate File. This is done by carrying out a modified Polynomial Transformation on 3 to 5 common Points. These common Points must be clearly identifiable on the **Image** (such as Grid Intersections), and their true, System Co-ordinates must be known. The System Co-ordinates can be entered into the Sheet's Co-ordinate File, if required, as the System positions for digitized Points can be identified by either entering their **[Y, X]**, or **[E, N]** values, or by entering their **Point Names** and then letting the Programme read the co-ordinates from the **Co-ordinate File**.

The **Image** used should have no, or a very small orientation difference to the defined System. It is unadvisable to have Images that need to be Swung (re-oriented) as displaying such **Images** is very slow. If the **Image** has been derived from a scanned source, use the scanner software to correctly orient the **Image**, as closely as possible, before Importing it into **SURPAC**. If a small orientation difference exists (less than 1 degree), then this can be eliminated by carrying out localized Shifts (by using the **Image Shift – [IS]** Command) before digitizing in an area.

Select a display Scale such that the entire **Image** fits into the current Screen Viewing Area. Place the Cursor anywhere within the area of the Sheet **Image** that is to be **Transformed**, and then give the **[IT]** Command (or select the option from the "**Image**" menu). The Programme will then display a Transformation Data Form on the Screen which is to be used for displaying the Co-ordinates of the **Image** digitized Points and entering their true, System values. This Form will remain on top of the other Screen data as long as this transformation mode is being used. The Form may be moved around the Screen in the normal Windows manner, if it is obscuring any necessary detail.

On the **Image**, move the Cursor to the first common Point and set the Cursor as close as possible onto this Point and then click the **Mouse [LHB]**. The **Image** Co-ordinates of this common Point will be displayed on the Transformation Data Form under the headings **Image Y-value** and **Image X-value**. In the Input Box labelled **True Y-value**, either enter the Name of the common Point (only if its co-ordinates exist in the Sheet's defined Co-ordinate File), or enter the true, System Y co-ordinate, and then in the **True X-value** Input Box, enter the true, System X co-ordinate.

Repeat this procedure for up to 5 common Points. After each new Point is added, check the **Image** Transformation Parameters displayed at the bottom of the Form. If a large **Std. Devn** is displayed then check the entered data for errors. As discussed above, substantive Swings, or orientation differences (in excess of 0.5 degree) should be avoided. If large swing does exists, then Delete the Image, use the scanner software to re-orient the source Image, and then Import the Image again, before carrying out a new Transformation.

Once a series of common Points has been employed to produce a satisfactory

Transformation, click the **Proceed** Button on the Transformation Data Form. The Programme will then clear the Screen display and redraw the **Image** using its new Position and Size. Check the common Points to see how closely they fit with the corresponding **Image** Points. If large errors are still present, then re-do the Transformation, or apply Shifts and/or Scale Factors by using the **Image Shift – [IS]** Command.

2.5.2 Digitizing Points from a Sheet Image – [II]

This Command is used for **Digitizing** Points and storing them on the current **Co-ordinate File** .

Before Digitization takes place, the Sheet **Image** should first be correctly Positioned and Sized, according the current Co-ordinate System being used for the Sheet. To do this, use the **Transform a Sheet Image – [IT]**, and/or the **Shift a Sheet Image – [IS]** Commands.

Place the Cursor anywhere within the area of the Sheet Image, and then give the **[II]** Command (or select the option from the "**Image**" menu). The Programme will display a Form displaying various Digitizing Options for the new **Points**. As the digitization process will determine the **[Y, X]**, or **[E, N]** co-ordinates, the **Point** Heights, if required, must be either defined by the User (very slow), or, if a **DTM** exists, interpolated from the defined **DTM** (much faster). For **Points** lying on Contours, or

positions of constant Height, that Height may be given and used for all subsequent **Point** digitization.

There is also an Option to display the **Points** on Screen as they are added to the Co-ordinate File via the Digitization. Finally, if a sequence of **Points** is required, enter a Point Starting Name, making sure that this Name ends with a numeric Value. The Programme will then increment the **Point** Names as new **Points** are digitized. For example, if a Starting Name of **MY1** is given, then the first Point will be named **MY1** and the subsequent Points will be named **MY2, MY3** .....

Once the required Options have been set and the **OK** Button clicked, any position on the Sheet Image may now be digitized, by clicking the **Mouse [LHB]**, once the Cursor has been correctly positioned at the required location. Continue in this manner for as many **Points** as is required.

To terminate the Digitization Mode, press the keyboard **[Esc]** Key.

2.5.3 Adjusting a Sheet Image Brightness and Adjusting a Sheet Image Contrast

These functions allows for modifying either an **Image's Brightness** and/or its **Contrast**. If an **Image** is to be used as a background to a Sheet, for example, it may need to have its **Brightness** and **Contrast** modified so that the Sheet Items (**Lines**, **Text Items**, **Marks** etc.) stand out against the background.

Move the Mouse cursor over the **Image** required, then click the **Mouse** [**RHB**]. Select either the "**Adjust Image Brightness**" or the "**Adjust Image Contrast**" item from the "**Image"** Main menu heading.

On the displayed Form, use the Mouse cursor to move the **Adjustment** bar Button until the required effect has been achieved, then click the **[Save and Exit]** Button. This process may be repeated any number of times.

Note : The **Image** that is modified is the Sheet copy of the **Image**, and not the original **Image** itself. For example, if you have an **Image** called "**Brits.jpg**" and you Import this **Image** into a Plot Sheet called "**Smithville Township**", **SURPAC** will create a copy of the original **Image**, call it "**Smithville Township - PlotBMP(1).bmp**" (if this is the first **Image** in the Sheet), and then save it in the defined **SURPAC** data Folder. All **Image** adjustments, scaling, resizing etc. performed in **SURPAC** will be to the copied **Image**. So, if you do make a hash of a Sheet **Image**, you can always Delete it and re-import from the original.

2.6 Extended Mark Point functions

New **Mark Point** styles incorporated are :-

A blank Circle in a solid Square
A blank Square in a solid Circle
A diagonally half-solid Square
A chequered Square

New Options for **Mark Points** allow you to change the **Size**, **Foreground Colour** and **Background Colour** of existing **Mark Points**.

Modifications made to SURPAC Version 5.05, Release 02

1. Modification to the Line Thickness function

Some printers were not recognizing the **Line Thickness** value for Pen #1. **SURPAC** has now been modified to correct this. The problem appeared to be sporadic and depended on the printer, or printer driver used.

SURPAC now uses "double prompting" every time the printer has to receive a line thickness command, in order to make sure that the information gets through correctly. Hopefully this problem is now resolved.

2. Modifications to the Diagram CAD Programme

This Programme has been modified so that the **Font Name**, **Size** and **Style**, as well as the **Point Circle Size** may be User selected either before, or after, a **Diagram** is constructed.

When starting a **new Diagram**, a Form will be displayed, allowing the above options to be set.

For an **existing Diagram**, select the menu item "**Select Standard Font and Settings**" menu item, found under the "**File**" main menu to display the Form.

3. Downloading Observations from Leica Total Stations and GSI ASCI Files

Some Users employ the Word Index 42 to store Point Descriptions, whilst others seem to prefer just using the standard Word Index 41.

The previous version of **SURPAC** was reading Point Descriptions from Word Index 42, even if the data contained was null (blank). This effectively led to the overwriting of the Description contained in Word Index 41 with blank information.

This has now been corrected.

4. Changes to the Contour CAD Programme

4.1 When creating **BreakLines**, by means of the Point-by-Point construction, the Programme was not "snapping" the constructed lines onto the selected Points. (Users still employing this "manual" technique are reminded that the "**Auto BreakLine Creation**" function is much faster!!)

Although the Points were being correctly recognized, and the appropriate **BreakLine** Descriptions allocated, the lines did not appear visually correct, unless a Screen Refresh was carried out.

This has now been corrected.

4.2 The "**Triangulation Polygon Functions …**" menu item (under the "**Triangulation**" main menu) is now always enabled, even if no triangulation exists. Since this function can be used for **Deleting** and/or **Importing Points** within a defined polygon area, the use of the function is not necessarily limited to sheets that have an existing triangulation.

5. Reduction of an Observation File (to a Co-ordinate File or a Tachy File)

When reducing an **Observation File**, **SURPAC** first checks to see if all the **Set up Points** exist in the current **Co-ordinate File**.

If one, or more, of the defined **Set Up Points** dos not exist, you will be given the option of letting **SURPAC** determine the **[Y, X, Z]** (or **[E, N, H]**) values for the missing **Set Up Point(s**). To do this, **SURPAC** will use both the Forward and Back (if available) observed Polar data to calculate each missing **Set Up Point**.

This technique is aimed at providing a rapid calculation facility for the computing of temporary “side” stations, or even an open traverses, where such **Set Up Points** are used to determine the co-ordinates of surveyed beacons, or tacheometric points, within the **Observation File**.
The technique uses weighted Orientations, and fully reduced Distances and Height Differences in calculating the values for the missing **Set Up Points**. Distances and Height differences are meaned between Forward and Back measured data (where applicable).

The above technique applies no form of mis-closure, or statistical comparison to the acquired results, and the accuracies of the determined values are completely dependent on the accuracy and quality of the observation set contained in the **Observation File**.

For accuracy and safety, therefore, it is still recommended that **Set Up Points** that form part of a Control Network, such as a Traverse or Triangulation network, be calculated using the appropriate Least squares Network adjustment programme, or Field Traverse programme, prior to reducing the **Observation File**.

6. Diagram CAD Programme : Automatic Data and Consistency function

This function automatically scans the Diagram’s Data Blocks, and uses the found Directions, Distances and Co-ordinates to carry out and display a consistency check between the Polar data and the Co-ordinate data. Areas are also computed using both the Polar and Co-ordinate data.

The function is called by either simultaneously pressing the **[CTRL]+[D]** keys, or by selecting from the “**Figure**” menu.

In the previous Upgrade (Release 01), the Right Hand Data Box was increased in width by 5mm, to conform with SG requirements.

This, unfortunately, caused an interference in the Programme’s **Automatic Data and Consistency** function. This has now been corrected.

Modifications made to SURPAC Version 5.05, Release 03

1. New Contour Labelling function (Contour CAD Programme)

Contours may be **Labelled** at the start and end of the Contour lines, and at User defined mid-Contour positions.

When mid-Contour **Labels** are required, contour Gaps are created on the selected contours to accommodate the **Labelling**.

Once created, Contour **Label** items behave as normal **Text** Items and may be **Edited**, **Moved Copied** or **Deleted**.

When importing a Contour File into **the C.A.D. Drawing and Plotting** Programme, you have the option of importing any Contour **Labels** that have been created for the Contour File. These **Labels** will be displayed whenever the Contours themselves are displayed.

Set the Contour Labelling Options

Before commencing the Contour **Labelling** process, use this function to set the :-
Label Contour Interval
Label Text Size
Label Text Colour (Pen)
Label Text Width to Height Ratio
Label Text Styling

When creating the **mid-Contour Label Gaps** (see below), the Gaps will only be created through those Contours that match the defined **Label Contour Interval**. The width of the Gaps is determined by the **Label Test Size** and the **Label Width to Height Ratio**.

Create mid-Contour Label Gaps

If no mid-Contour Gaps are created, the Programme will only generate **Labels** at the start and end of the Contour lines. Therefore, it may be necessary to use this Command to create Gaps through a set of Contour lines at appropriate mid-Contour positions.

As many sets of mid-Contour line Gaps as is required may be created.

A set of mid-Contour Gaps may vary between a single Contour to the complete range of Contours.

To create a set of mid-Contour Gaps :-

1. Select this Command from the **Contours** Main menu.
2. Move the Cursor to the position from where the set of mid-Contour Gaps is to begin, and then either give the **[S]** command, or click the Mouse **[LHB]**.
3. Move the Cursor to the position where this set of mid-Contour Gaps is to end, and then either give the **[E]** command, or click the Mouse **[RHB]**.
4. Repeat the above process to create any further required sets of mid-Contour Gaps

Note. If the **Contours** have been generated by the **Triangulation** method, then the **Triangle** data file (file type ***.wcs**) containing all the **Triangle** information is always available and can be used to quickly regenerate the **Contours**, if this becomes necessary. If, for example, you want to remove all the created mid-Contour Gaps, then select the **Create New Contours** menu item, and then the **From Surface Triangulation** sub-menu item. Then, when prompted, reply "**No**" to the prompt to re-Create the Triangles. Reselect the required Contour **Interval**, and the Contours will be restored. Finally, remove the display of the **Triangulation** and apply the Contour **Smoothing** option, if required.

Label Start/End and mid-Contours

Once the Labelling Options have been set and the mid-Contour Gaps created, automatic generation of the Contour Labels is activated using this Command.

Note that Contour **Labels** will not be duplicated if this Command is repeated. Before Labelling commences, all existing **Labels** are automatically Deleted to prevent duplication.

Delete Existing Contour Labelling

Contour Labels are normal Text Items **and may be** Moved**,** Copied**,** Edited**, dynamically** repositioned**,** oriented **and/or** resized **like any other** Text item**.**

However, Contour **Labels** have a specific "tag" which identifies them as such for the Programme. This means that when this **Deletion** Command is given, only the **Contour Label Text Items** will be **Deleted**, and not any other **Text** Items such as **Headings** or **Grid Labels**.

2. Creating Tacheometric ASCII Files

This new function can be found under the **[Option]** Button of the **Tacheometric File Editing** Programme.

Various **ASCII** format files may be created, depending on the User requirement.

First, select the required file **Name** and **Extension** from the displayed File Open dialogue box.

Next, from the displayed screen options, selected the required **Number of Decimal Places**, the **ASCII File Type** and, if required, either the **Geodimeter 610** Format option or the **Leica GSI-8 bit** format.

The **Fixed Column** option creates **ASCII** files in which all data are listed in set column positions, i.e. the decimal point, or comma, will always be vertically aligned for all items of the same type .

The **Comma Separated** option creates data lines in which data items are separated by commas and no attempt at vertical alignment is made. All decimal markers are forced to decimal points, regardless of what the setting is in **SURPAC** for general data display and printing.

The **TAB Separated** option creates data lines in which data items are separated by a **TAB** (ASCII Character 9). Although no attempt at vertical alignment is made, files containing narrow data items can be confused with Fixed Column files. End users should, therefore, check for the existence of TAB characters before using these file for data importing. All decimal markers are forced to decimal points, regardless of what the setting is in **SURPAC** for general data display and printing.

The required number of decimal places may also be set.

3. Downloading Data from a YOM 3Ta Total Station ASCII File

3.1. Downloading Observation Data

At this stage, transferring Observation data from a **YOM 3Ta** Total Station is done via an **ASCII** File create/read routine.

Before running the appropriate **SURPAC** Programme, use the **YOM 3Ta** to download an **ASCII** file.

To ensure that all Observation Data conform with the **SURPAC** Observation Code Format used for all **General Observation Files** , certain information related to Station, or Beacon, Status must be included with the normal observation entities such as Horizontal Angle, Vertical Angle, Slope Distance Instrument Height, Target Height and Point Description Code.

Setting the SURPAC Observation Codes and Point Description Codes

The **YOM 3Ta** allows for seven discreet data Blocks per Line of downloaded information.

The **First Block** (or measurement tag) contains information which allows **SURPAC** to deduce whether the current data Line is a Set Up Line (**Code 01** or **Code 02**) , an Orientation Line (**Code 04**), or a Measurement Line (i.e. Polar or Tacheometric Point, **Code 05**). If other Codes are required (such as **Code 03** or **Code 06**) then these must be edited, in **SURPAC**, once the download is complete.

SURPAC will allocate a **Code 02**, if a Set Up Point pre-exists in the current Co-ordinate File, otherwise a **Code 01** will be allocated to a Set Up Point.

The **Second Block** is the Point, or Station Number.

Use the **Third Block** to define the Point, or Station, **Description Code** (a number in the range 0-499, or an alphanumeric code of up to 6 characters).

The remaining **Blocks** (4 – 7) are used for the Observational Data, or Point Co-ordinates.

Accessing the YOM 3Ta Data Transfer facility in SURPAC

- In the **Main Menu Bar**, Click the Heading **Topographical**. Then, from the displayed Menu, click the Item **General Observation File Load/Edit**.

- Load the required **General Observation File** (or Open a new File).

- Near the Top Left corner of the displayed Programme form click the **ASCII Import Button**.

- On the newly displayed form select the **YOM 3Ta Format** Option, then click the **Proceed Button**.

- Finally, select the **ASCII** File (normally a **.dat File) from the displayed **File Selection** form.

3.2. Downloading Co-ordinate Data

At this stage, transferring Co-ordinate data from a **YOM 3Ta** Total Station is done via an **ASCII** File create/read routine.

Before running the appropriate **SURPAC** Programme, use the **YOM 3Ta** to download an **ASCII** file.

Accessing this Data Transfer facility in SURPAC

- In the **Main Menu Bar**, Click the Heading **General**. Then, from the displayed Menu, click the Item **Co-ordinate File Editing**.

- At the Top Left corner of the displayed Programme form click the **Options Button**. A new, smaller, form will be displayed, showing the available Options.

- Click the **Import Data from an ASCII Text File** Option, and then click the **OK Button**.

- On the newly displayed form select the **YOM 3Ta Total Station ASCII Format** Option, then click the **Proceed Button**.

- Finally, select the **ASCII** File from the displayed **File Selection** form, containing the required **YOM 3Ta** Co-ordinate data.

The **YOM 3Ta** allows for seven discreet data **Blocks** per Line of downloaded information.

The **First Block** (or measurement tag) contains information which allows **SURPAC** to deduce whether the current data Line contains Co-ordinate data, or whether it as an Observation Line.

The **Second Block** is the Point, or Station Number.

Use the **Third Block** to define the Point, or Station, **Description Code** (a number in the range 0-499, or an alphanumeric code of up to 6 characters).

The next 3 **Blocks** (4 – 6) contain the Point Co-ordinates.

4. Additional Options for Field Traverse and Data Traverse Adjustments

The mis-closure of a **Field Traverse**, or a **Data Traverse**, may now be adjusted for by using one of three different available techniques. The technique used to adjust the Traverse is User selectable, and the three options are displayed at the same time that the Traverse mis-closure information is displayed (at the Traverse closure). The three Adjustment options are :-

A **Helmert Transformation** (only when using non-common Start and End Points),
A **Bowditch Proportional Distance** adjustment, or
A **Bowditch Proportional [DY, DX, DZ]** adjustment.

The **Helmert Transformation** method uses the (non-common) traverse Start and End Points to determine an **Orientation Swing** and a **Linear Scale Factor** to be applied to the surveyed data. The traverse is then re-computed using these modified data.

The **Bowditch Proportional Distance** method applies an adjustment to the **DY**, **DX** and **DZ** components of each traverse leg (the **DZ** component only applies to **Field Traverses**). The adjustment used is a fraction of the total **DY**, **DX** and **DZ** mis-closure of the traverse, with this fraction being calculated as a ratio between the distance of an individual traverse leg and the distance of the total traverse.

The **Bowditch Proportional [DY,DX,DZ]** method also applies an adjustment to the **DY**, **DX** and **DZ** components of each traverse leg (the **DZ** component only applies to **Field Traverses**). The adjustment used is a fraction of the total **DY**, **DX** or **DZ** mis-closure of the traverse, with this fraction being calculated as a ratio between a scalar component (**DY**, **DX**, or **DZ**) of an individual traverse leg and the scalar sum of all the corresponding components in the traverse.

For the **Field Traverse**, the simultaneous **Least Squares Adjustment** technique is also available by using the **Least Squares Planimetric Adjustment** programme to adjust the [Y, X] values, and the **Least Squares Trigonometrical Height Adjustment** programme to adjust the heights.

5. Importing Data from AllyCAD A4 – A0 DXF Files

For Users wanting to convert their **AllyCAD** files to **SURPAC**, they will first have to use **AllyCAD** to create **DXF** formats of the required drawing files. This has been necessitated due to the owners of **AllyCAD** being unwilling to release the data storage format of their drawing sheets.

The **C.A.D. Drawing and Plotting Programme** includes a specific Import option for **AllyCAD DXF** files. The transformation variables have been preset in the programme so that the imported data are correctly oriented, positioned and scaled when viewed in **SURPAC**.

Step 1
Create, or load, a “dummy” **Co-ordinate File** whose Name includes the word “AllyCAD” (e.g. “AllyCAD DXF Import”). The file’s **System** should be set as Local.
The file should contain 2 Points whose values are :-

Y1 = +1000 **X1 = -1000**
Y2 = -1000 **X2 =+1000**

This will provide a plot area centered at the Point **Y = 0** and **X = 0**.

Step 2
Load the **C.A.D. Drawing and Plotting Programme**.
If the Programme loads an existing Plot Sheet, then go to the Programme’s **File** menu and select the **Open/Create a Plot File Sheet** item.

Step 3
Using the **[Browse]** Button on the **Sheet SetUp** (Parameters) information form, set a required Sheet **Name**.
Other Sheet parameters should be :-
Sheet Size = **A4** (unless you know that the **DXF** file contains a Sheet of another size)
Sheet Orientation = **Portrait** (unless you know it should be **Landscape**)

Sheet Scale = **1 : 1000**
Sheet Swing = **0°** (unless you are using **Landscape**, when Swing should be **90°**)
Sheet Margins = **10mm**
Text width to Height = **0.45**
Text Size = **2.5mm**
Text Font = "**Monospac821 BT**" or "**Courier New**"

Ignore all other selection options.
Press the **[OK]** Button

Step 4
From the Programme's **Import** menu, select the Import from an **AllyCAD DXF File** item.

Step 5
Select the required **DXF** file from the displayed File Select/Open form.
The programme will then run the **DXF** Import routine, which will only take a few seconds, and the display the imported **Line** and **Text** items.

To create a new Sheet from another **DXF** file, go to the Programme's **File** menu and select the **Open/Create a Plot File Sheet** item. Then repeat the above from **Step 3**.

6. General Plan CAD Programme : Data and Consistency function (Ctrl + D)

This function can be used to rapidly produce **Data** and **Consistency** reports for Stands in a **General Plan** Sheet.

The function is called by either simultaneously pressing the **[CTRL]**+**[D]** keys, or by selecting the appropriate menu item from the Programme's "**Data**" menu.

This function uses **Directions**, **Distances** and **Co-ordinates** of a Stand to carry out and display a Consistency check between the Polar data and the Co-ordinate data. **Areas** are also computed using both the Polar and Co-ordinate data.

The **Directions** and **Distances** are identified by Clicking on the appropriate items on the General Plan Sheet. If the **Direction** identified lies on the "incorrect" side of the current Stand, then it may be modified by clicking the appropriate Button that will automatically add/subtract 180° to the **Direction**.

Users now have the option of setting the default **Stand Number** for a new calculation to the next logical number, or to get the programme to locate and display the existing **Stand Number** closest to the cursor position at the time the **[CTRL]**+**[D]** Command is given.

Modifications made to SURPAC Version 5.05, Release 05

1. All CAD Programmes – Improved DXF file import functions

All **SURPAC CAD** programmes have been modified to enable the import of **AutoCAD R14/2000** type **DXF** files.

These DXF files can now be imported, whilst maintaining the following attributes :-

- **Line Colours**
- **Line Thicknesses**
- **Line Styles**
- **Text Fonts**
- **Symbol Fonts**
- **Text Styling**
- **Text Colours**

The inclusion of the **Text Fonts** and **Symbol Fonts** depends on whether the PC running **SURPAC** supports (i.e. has installed) the appropriate Fonts that have been used by the **AutoCAD DXF** file that is being imported.

The adoption of the **DXF Line** and **Text** Colours is most evident when using the **CAD Drawing & Plotting** Programme, as these colours are displayed when the programme identifies the various **DXF** Layers in the importing file. For the **General Plan**, **Working Plan** and **Diagram** Programmes, Users are forced to link an incoming **DXF** Layer to one of the Sheet Pens (Pens 1 to 8)

2a. Diagram CAD Programme – New Diagram Creation Options

Creating a New Diagram

When creating a **New Diagram**, you will be given the option of selecting one of five methods of creating the **Diagram**, which are :-

1. Create Diagram Information using Co-ordinate File Points (Previous Normal method)

2. Create Diagram Information using current CAD Plot Sheet

3. Create Diagram Information using the current Working Plan

4. Generate Diagram from a "SURPAC" type DXF File

5. Generate Diagram from an "AllyCAD" type DXF File

1. Create Diagram Information using Co-ordinate File Points

On selecting this method, the **Diagram Data Entry** form will be displayed. This Form allows you to enter basic information for a **Diagram** such as the **Points** making up the main figure, identifying the required **Trigonometrical Beacons**, **Servitude** information, **Connecting** data etc.

At the bottom of the **Diagram Figural Data Entry** Form is a **Point Name Display Window** from which **Points** may be selected by clicking them.

2. Create Diagram Information using current CAD Plot Sheet

On selecting this option, **SURPAC** will display the current **CAD Plot Sheet**. If no **CAD Plot Sheet** has been defined during the current session, a **CAD Plot Sheet** having the same name as the current **Co-ordinate** file will be loaded. If you want to use a **CAD Plot Sheet** other than this default Sheet, then you must first run the **CAD Drawing & Plotting** programme, through which you can define and load the required **CAD Plot Sheet**.

The cursor will be set to the **SURPAC** "digitize cursor", indicating that the programme is waiting for you to identify the Points to be used for the **Diagram**. Whilst in this mode, you are free to **Zoom** or **Pan** about the **CAD Plot Sheet**.

Once you have located and displayed the are containing the required figure, click the cursor close to the top, left hand Point of the figure. The cursor will snap onto this Point and use it as **Point "A"** for the **Diagram**. Go around the figure in a clockwise direction, clicking onto all Points making up the figure. Finally, again click onto the first Point (**Point "A"**) to indicate to the programme that the figure has been closed, and all Points have been identified.

NB
If you make a mistake in identifying a Point, just press the **[Esc]** Key. You will then be given the option of going back one step (i.e. ignoring the last Point clicked), or cancelling the **Diagram** creation altogether.

You cannot identify a Point more than once. If you do inadvertently click a Point twice, you will receive an appropriate warning that that Point has already been used for the Diagram.

Once you have closed the figure, any existing **Lines** and/or **Text** Items, within a calculated search limit (40% of the width of the figure), will be tagged as to be included as part of the figural plot of the **Diagram**.

The **Diagram Figural Data Entry** Form will now be displayed, and will include the **CAD Plot Sheet** selected Points as the Points to be used for the **Main Figure** Points. You can now add the Trig./Town Survey Marks, headings etc. as described in the previous section. Once this is complete, click the **[Proceed] Button** to return to the main **Diagram Graphic Editing** Programme.

Apart from the Data Block information and the Main Figure plot, all the located Line and Text Items on the **CAD Plot Sheet** will be displayed. These, obviously, may be edited/moved/deleted etc. in the normal way.

3. Create Diagram Information using the current Working Plan

On selecting this option, **SURPAC** will display the current **Working Plan Sheet**. If no **Working Plan Sheet** has been defined during the current session, a **Working Plan Sheet** will have to be SetUp before proceeding. If you want to use a **Working Plan Sheet** other than the default Sheet (normally Sheet No. 1), then you must select the required Sheet number once the Working Plan programme is running.

The cursor will be set to the **SURPAC** "digitize cursor", indicating that the programme is waiting for you to identify the Points to be used for the **Diagram**. Whilst in this mode, you are free to **Zoom** or **Pan** about the **Working Plan Sheet**.

Once you have located and displayed the are containing the required figure, click the cursor close to the top, left hand Point of the figure. The cursor will snap onto this Point and use it as **Point "A"** for the **Diagram**. Go around the figure in a clockwise direction, clicking onto all Points making up the figure. Finally, again click onto the first Point (**Point "A"**) to indicate to the programme that the figure has been closed, and all Points have been identified.

NB
If you make a mistake in identifying a Point, just press the **[Esc]** Key. You will then be given the option of going back one step (i.e. ignoring the last Point clicked), or cancelling the **Diagram** creation altogether.

You cannot identify a Point more than once. If you do inadvertently click a Point twice, you will receive an appropriate warning that that Point has already been used for the **Diagram**.

Once you have closed the figure, any existing **Pen 1 Lines** and/or **Text** Items, within a calculated search limit (40% of the width of the figure), will be tagged as to be included as part of the figural plot of the **Diagram**.

The **Diagram Figural Data Entry** Form will now be displayed, and will include the **Working Plan Sheet** selected Points as the Points to be used for the **Main Figure** Points. You can now add the

Trig./Town Survey Marks, headings etc. as described in the previous section. Once this is complete, click the **[Proceed] Button** to return to the main **Diagram Graphic Editing** Programme.

Apart from the Data Block information and the Main Figure plot, all the located Line and Text Items on the **Working Plan Sheet** will be displayed. These, obviously, may be edited/moved/deleted etc., in the normal way.

4. and 5. Generate a Diagram from a "SURPAC" or an "AllyCAD" type DXF File

There are two **DXF** options, one for importing "**AllyCAD**" type files (that require re-orientation and Text scaling), and the more normal "**SURPAC**" type **DXF** file,s which conform more closely to the standard **AutoCAD** layout. Users would need to know the origin of the **DXF** file, before importing, in order to decide which option to use. If uncertain, use the "**SURPAC**" format.

When **SURPAC** imports these **DXF** files, the data items are identified as individual items and placed in appropriate data containers. This allows for the use of the automatic **Data** and **Consistency** function, **[Ctrl]**+**[D**], and the **Figure Move/Scale/Rotate** function **[Ctrl]**+**[M**] function (Refer to the **Figure Move/Scale/Rotate** topic further on in this letter).

For the "**AllyCAD**" type **DXF** files, the fixed width default Font of "**Monospac821**" is used.
For the "**SURPAC**" type **DXF** files, the variable width default Font of "**Arial**" is used.

2b. Diagram CAD Programme – Sizing, Positioning and Rotating the Figure

The Figure may be Moved and/or Scaled (Resized) and/or Rotated as follows :-

From the Programme's Main Menu, click the **Figure** Heading, then click the **Move/Scale/Swing Figure** menu item.

(Alternatively, you can simultaneously press the **[Ctrl]** and **[M]** keys)

All **Lines** in the Figure Area (donated by the surrounding grey dashed lines) will now be displayed in purple, and the cursor will be located at the Figure centre. The **Text** Items will be hidden during any **Figure Move/Scale/Rotate** activities.

1. All **Figural** and **surrounding Lines** will **Move** as the Mouse **Cursor** is **moved**.
2. Pressing either the **[<]** or **[>]** Keys will **Rotate** all the **Lines** about the Figure centre.
3. Pressing either the **[+]** or **[-]** Keys will **Scale** the **Figure** and **surrounding Lines**. The scales used are a logical set of scales appropriate to a Diagram display (e.g. 1:100, 1:125, 1:150, 1:200 etc.)

To **Abort** the above and return to the original Figure Position/Scale and Rotation, press the **[Esc]** Key.

To **Save** changes made (as per the current Figure display) click the mouse **[LHB]**.

3. Long Section Plotting – Programme amendments

Panning by using the Mouse

The New **Panning** option has been added. This option use the **Mouse** to control and define the **Pan** function without the necessity of pressing any keyboard keys. Once this Mouse operation have been mastered, Panning a Screen display is much simpler and quicker than using the Scroll Bars.

To Pan (move about) within the available Screen Display - Press and hold the **Mouse [LHB]** and then drag the cursor in the required direction. As the cursor is moved, the position of the Screen Display will change in response to the cursor movement. The Screen Display can be moved to any position within the limits of the Horizontal and Vertical Scroll Bars. Once the required location has been reached, release the **Mouse [LHB]**. Either the Horizontal, or the Vertical Scroll Bar position indicator (or both) will change in response to this **Panning** action.

New Screen Limits

The available screen area for plotting a section has been modified to allow a more appropriate allocation to the height and width components of the display. The programme will first determine the maximum display height required for the plot (using the User defined Vertical Scale), and then maximize the horizontal limit by allocating all available display memory along the horizontal axis. If this still is insufficient display for the defined Horizontal Scale, an appropriate warning message will be displayed. If this warning is ignored, the plot will be truncated.

4. New Options for Field Polar reductions and Field Traversing

When reducing **Field Polars** (from an **Observation File**), or carrying out a **Field Traverse** calculation, a Form will be displayed which shows two new prompts, namely :-

Std. Deviation Limit for Set Up Orientations
Show the individual Orientations for each Set Up Point

The first prompt requires an entry that will represent the maximum allowable limit for the Standard Deviation of a set of Orientations taken at a Set Up Point. A warning message and sound will appear if this limit is exceeded.

The second prompt queries whether you would like each Orientation made at a Set Up to be displayed, or not.

If you click this option (i.e. an **X** appears in the check box), then once a Set Up Point has been selected (by clicking on the Point's Name in the "Set Up Points" display list), an on-screen display will be made showing each Orientation Point used at the Set Up, along with their Orientation corrections and the weighted mean.

If this option is left open (i.e. an empty check box) the individual orientations will not be displayed on screen (in the case of the Traverse they will still be printed as part of the Traverse output), and only a warning will be given if the above mentioned limit is exceeded.

5. New SURPAC Calculator Functions

The **SURPAC Calculator** has had a number of enhancements made to it, including a new series of Mathematical and Financial functions. If you are not familiar with the **SURPAC Calculator**, you can display it by either selecting the appropriate menu item from the "**File**" main menu heading, or by clicking the calculator icon near the right hand side of the **SURPAC** status bar (at the bottom of the screen).

Financial Functions

Payment Installments

This function calculates the **Installment Payments**, using a fixed **Interest Rate**, over a given **Period**, for a **Loan Amount**. Reply to each prompt by entering the appropriate value and pressing either the **[=]** Button, or the **[Enter]** Button. Note that the **Period** is always in **Months**, the **Interest Rate** is the **Annual Interest Rate**, and the calculated **Installment** is per **month.**

Future Value

This function calculates the **Future Value** of a present **Lump Sum**, and/or **Monthly Payments**, using a fixed **Interest Rate** and over a given **Period**. Reply to each prompt by entering the appropriate value and pressing either the **[=]** Button, or the **[Enter]** Button. Note that the **Period** is always in **Months**, the **Interest Rate** is the **Annual Interest Rate.**

Present Value

This function calculates the Present Value **of a future** Lump Sum**, and/or** Monthly Payments**, using a fixed** Interest Rate **and over a given** Period**. Reply to each prompt by entering the appropriate value and pressing either the** [=] **Button, or the** [Enter] **Button. Note that the** Period **is always in** Months**, the** Interest Rate **is the** Annual **Interest Rate.**

Interest Rate
This function calculates the **Interest Rate** that would need to be charged, in order to pay off a present **Loan Amount** (or **Lump Sum**), using a fixed **Interest Rate** over a given **Period**. Reply to each prompt by entering the appropriate value and pressing either the **[=]** Button, or the **[Enter]** Button. Note that the **Period** is always in **Months** and the calculated **Interest Rate** is the **Annual Interest Rate.**

Currency Unit
Use this function to enter a required User **currency symbol**, e.g. **R**, **$**, **P** etc. This User symbol will be stored for future use.

Survey Functions

Join Calculation
This function carries out the standard, 2-dimensional **Join** calculation between two **Points**. These may be **Points** existing in the current **Co-ordinate File** (in which case their values will automatically be loaded), or **Points** unrelated to the current **Co-ordinate File** (in which case you will be prompted to enter their values). When prompted for a **Point Name**, input the **Name** if the **Point** exists in the current **Co-ordinate File**, or just click the **[Enter]** Button, and input the **Point's** values. The **Direction** and **Distance** between the two **Points** will be displayed, one at a time.

Polar Calculation
This function carries out the standard, 2-dimensional **Polar** calculation from a **Point**, using an entered **Direction** and **Distance**. The **Point** may exist in the current **Co-ordinate File** (in which case its values will automatically be loaded), or a **Point** unrelated to the current **Co-ordinate File** (in which case you will be prompted to enter its values). When prompted for the **Point Name**, input the **Name** if the **Point** exists in the current **Co-ordinate File**, or just click the **[Enter]** Button, and input the **Point's** values. When prompted for the **New Point Name**, just press **[Enter]** if you do not intend saving this **Point**. After the display of the **New Point** co-ordinates, you will be given the option of **Saving** the **New Point** to the current **Co-ordinate File**.

Mathematical Functions

Mean and Standard Deviation
This function will determine the **Mean** and **Standard Deviation** of a series of entered values. Each value entry must be followed by clicking the **[Enter]** Button. After entering the last value, click the **[=]** Button to display the **Mean**. Click the **[=]** Button again to display the **Standard Deviation**.

Factorial
Calculates the Factorial value of a non-zero, positive integer.

Enter Button
For most operations, the **[Enter]** button acts the same way as the **[=]** button. There are, however, certain functions (such as the **Mean and Standard Deviation** function) where the **[Enter]** button must be used when entering a list of values, and the **[=]** button used to indicate the completion of the data entry.

Power Function
Calculates **X** to the power of **Y**. Either **X** or **Y** may be non-integer, and/or negative quantities, if this is required. Input the **X** value, then click the **[X^Y]** button. Next input (or calculate) the power value, **Y**, then click the **[=]** button.
For example, to calculate **9^(1/3)**, input **9** and click **[X^Y]**. Then input **1** then click the **[/]** (divide) button and input **3**. Finally, click the **[=]** button. The function will first compute the value **1/3** and then compute and display the result **9^(1/3)**.

Inverse Function
Calculates the **Inverse** of the displayed value

Square Function
Calculates the **Square** (X^2) of the displayed value

Square Root Function
Calculates the **Square Root** (SQR(X)) of the displayed value

Arc Sine Function
Calculates the **Arc Sine** of the displayed value, and displays the result in the **DMS** mode.

Arc Cosine Function
Calculates the **Arc Cosine** of the displayed value, and displays the result in the **DMS** mode.

Arc Tangent Function
Calculates the **Arc Tangent** of the displayed value, and displays the result in the **DMS** mode.

S-Key E-Key Y-Key N-Key
Clicking any of these buttons is the same as pressing the equivalent keyboard key. **S** is used for replying “Start” to certain prompts, **E**, and is used for replying “End” to certain prompts. **Y** and **N** are the usual “Yes” and “No” prompt replies, respectively.

Convert to “Deg Min Sec” (DMS) format
Converts the displayed value to the **DMS** mode. Angles (or Directions) may be **added** or **subtracted** in the **DMS** mode, as follows :-
Input a **DMS** angle, using the normal **SURPAC DDD.MMSS** method. Then click the **[DEC]** and then the **[DMS]** buttons, (this will display the angle using the current **SURPAC DMS** display settings). Then, input the **DMS** angle to be added, or subtracted, also using the **DDD.MMSS** method, and finally click the **[=]** button.

Convert to Decimal Degree format
Converts the displayed **DMS** value to the Decimal Degree mode (DDD.dddddddd).

Modifications made to SURPAC Version 5.05, Release 06

Downloading and Installing the SURPAC Control Files (for South African Users)

(Clarke 1880 (Modified) Ellipsoid to/from WGS 84 Ellipsoid Transformations)

Users in **South Africa** need to download the **SURPAC Transformation Control files** contained in the **PKZIP** Self-extracting file called "**Surpac Control Files.exe**", in order to be able to carry out **Clarke 1880 (Modified) Ellipsoid** to, or from, **WGS 84 Ellipsoid** transformations.

Download these files as follows :-

- Click on the appropriate **Button** displayed near the bottom of the download page and, when prompted, store the download file into any Folder such as "***C:\Surpac Download***", for example.

- After downloading is complete, use ***Windows*** Explorer to display the download Folder contents. Look for the file called "**Surpac Control Files.exe**" and double-click its Icon. This will Run the self-extracting **ZIP** file.

- On the displayed **PKZIP** Extraction Form, set the ***Destination*** Folder Name as that in which **SURPAC** is currently installed (the default is "***C:\Surpac98***"), then click the ***Finish*** Button.

- Once extraction is complete (which should only take a few seconds) the two control files be stored in the **SURPAC** installation folder.

- Finally, display the contents of the **SURPAC** Installation Folder and ensure that the two **SURPAC** files called "**LoLatLonList.sur**" and "**WGLatLonList.sur**" have been installed. Both of these files are approximately 1.1 Mb in size.

1. Clarke 1880 (Modified) to WGS 84 Transformations

Programme Overview

This programme provides for rapid and accurate transformations between the **Cape Datum** (**Clarke 1880 Modified Ellipsoid**) (either an **RSA** "**Lo**" System, or a **UTM** Zone System) and the **Hartebeesthoek94 Datum** (**WGS 84 Ellipsoid**) (either an **RSA** "**WG**" System or a **UTM** Zone System) within **South Africa**.

Two control files are provided that cover the entire country and which contain approximately 38,000 common Control Points.

*These files have been verified and compiled from data supplied by **SURPAC** Users, throughout South Africa, over the past 3-4 months. My thanks to those **SURPAC** Users who were approached by us with a request to supply common data that they might have, and who responded positively. To the very few who did not bother to respond – a big SIS, enjoy the efforts and contributions of others!*

To protect the data supplied by contributing Users, these files use a random binary structure, and their data are stored in a double precision [**Lat**, **Long**] format. These data also have variable false origin shifts applied to them making them unusable, except for the purposes of this programme.

To carry out a transformation, it is only necessary to have co-ordinate, or Geographical [Lat, Long], data related to one of the two Ellipsoids, and lying within the geographical boundaries of **South Africa**. These data may be contained in a **SURPAC** Co-ordinate file, an **ASCII** Co-ordinate file, an **ASCII** [Lat, Long] file or be **written** data that are to be entered manually.

The transformation carried out is by using either a **Weighted Helmert** transformation, or a **Standard** (non-weighted) **Helmert** transformation, with a User determined number of common control Points.

Due to the number of common control Points (38,000) the transformations are extremely localized and provide the highest accuracy of transformation possible between the two Ellipsoids. Tests have shown

that typical Standard Deviations resulting from transformations vary between 0.01m and 0.07m. Accuracies in high density urban areas tend to be higher, due to the larger number of common Points in these areas.

This programme is designed to satisfy the requirements of **Land Surveyors**, **Mine Surveyors** and **Engineering Surveyors** requiring high accuracy transformations for existing data and for **GPS** derived data. As such, this programme should not be confused with various other programmes that only offer approximate (0.5m – 1.5m) transformations for the purpose of small scale mapping, or non-survey related activities.

Due to the nature of the re-adjustment of the Hartebeesthoek94 co-ordinates (see the discussion below) using a transformation based on a table of adjustments, or parameters, for a given area cannot provide the same level of accuracy as that of a Weighted Helmert transformation that uses the 4 or 5 closest common Control Points lying around to the Point being transformed.

In spite of the high accuracy achieved by the programme, it is very straight forward to use. Once an initial transformation Point has been identified (from whichever input source), the programme will start by identifying a 1° wide strip, centered on the Longitude of this Point. All common control Points falling within this strip will be extracted from the Control files. Using the Latitude of the Point as the co-centre, a localized "Degree Square" is then determined and data within this 1° by 1° square become the control data for the transformation. This whole process takes approximately from 0.1" (for a Pentium IV 1.9Ghz PC) to 2.0" (for a Pentium II 450Mhz PC)!

For normal surveys, the programme will only need to carry out the above process once. For surveys covering large areas (in excess of 10Km in length or width, for example), the programme will automatically re-adjust its central Point whenever necessary and, therefore, its 1° by 1° square.

It is only necessary for the User to identify the System of the **Source Data** (even this is not required if a **SURPAC** Co-ordinate file is used as the **Source Data**), set the required transformation options, and then either select a Source Data file, or start manually entering written co-ordinates.

The Lo System (Cape Datum) and WG (Hartebeesthoek94 Datum) Systems

*(The following discussion is essentially that used with the introduction of the **Weighted Helmert Transformation** programme nearly two years ago. However, it was decided to repeat the discussion as the information contained below is of high importance to this current programme.)*

Mathematically, the task of converting planar co-ordinates derived from ellipsoids that have different parameters (Axis-major and Axis-minor) is not a difficult one, as long as these co-ordinates have been derived using the same ellipsoid-to-plane projection. Fortunately, the pre-existing Southern African "**Lo**" **System** (the **Cape Datum** based on the **Clarke 1880 (modified)** ellipsoid), the global **UTM System** (using either the **Clarke 1880 (modified)** or the **WGS 84** ellipsoid) and the new South African "**WG**" **System** (the **Hartebeesthoek94 Datum** based on the **WGS 84** ellipsoid) all use the **Transverse Mercator** projection for the derivation of the planar rectangular **[Y, X]** (or **[E, N]**) co-ordinates from their respective ellipsoidal geographical (**Latitude** and **Longitude**) positions.

The main problem related to transforming from the **Lo System** to, or from, the **WG System** comes about due to the Trigonometrical Station and Town Survey Mark co-ordinates in the latter system having been re-adjusted, by using upgraded triangulation and trilateration, with the inclusion of Doppler and **GPS** Station fixes, plus an astronomically observed baseline between Hartebeeshoek and Sunderland.

This naturally results in co-ordinate adjustment shifts between Trig. Beacons and TSMs, which are over and above the shifts, scaling and orientation changes brought about by the switching of ellipsoids.

Since the above adjustment shifts are mainly random in nature, it is not possible to produce a single set of transformation parameters that would satisfy co-ordinate transformations to the degree of accuracy required by Surveyors.

Transformations need to be localized, using common control Points close to the required position, or positions, of transformation, to ensure that that the local control Point random adjustment differences are correctly compensated for.

This brings up the topic of the transformation itself. Since the systems under particular discussion (the **Lo System**, the **WG System** and the **UTM Systems**) are all planar rectangular systems, a standard, non-weighted Helmert type transformation should suffice.

There are, however, two mutually exclusive criteria involved in a transformation, and the Surveyor needs to decide which of these two criteria is to be satisfied when carrying out a co-ordinate transformation.

Consider the hypothetical case of a farm diagram, on which the diagram co-ordinates define the farm boundaries as making an exact rectangle, and these are listed as **Lo System** values. Further, imagine a Trig. Beacon (or Station) situated very close to one corner of this rectangle, say within 50m, and assume further that this Trig. Beacon has adjustment shifts (errors) in the order of 0.10m, relative to other Trig. Beacons in the vicinity.

The two main options facing the Surveyor are :-

If a **Standard Helmert transformation** is carried out (which would apply equal weight to all the common control Stations used) the obtained co-ordinates of the 4 diagram Beacons, would still define an exact rectangle. This new rectangle may be shifted, be of a different scale and/or orientation when compared to the original rectangle, but the main consideration is that it would still be a rectangle. The farm Beacon close to the near Trig. Beacon would, however, have co-ordinates that would show the theoretical distance between this Beacon and the near Trig. Beacon, differing from the measured distance by an amount of about 0.10m.

If a **Weighted Helmert transformation** (using, for example, the inverse of the distance of a control Station from a given Beacon as its weight) is carried out, then the 4 pairs of transformed co-ordinates would no longer depict an exact rectangle. A comparison of the theoretical and measured distances between the corner Beacon and the close Trig. Beacon would, however, show a difference of only about 0.01m - 0.03m (depending on the proximity of the other common control Stations).

The decision as to what type of transformation to adopt in this, and other similar cases, needs to be that of the Surveyor. For precision Engineering surveys, for example, the inter-relationship between the survey Beacons could be of more importance than the relationship between any one Beacon and a nearby Trig. Beacon. For Cadastral Surveys, however, the relationship between the boundary Beacons and nearby Trig. Beacons could be more important than retaining the figural accuracy as determined from the co-ordinates of a previous survey.

Add to this the further transformation decisions of how many common control Stations are to be used, and it becomes obvious that a programme is required that is both flexible enough to offer the User a comprehensive set of options, and at the same time, remains straight forward to use.

Over and above the transformation of co-ordinate files, there are also the requirements of transforming existing, associated **CAD** files such as **General Plans, Working Plans, Sectional Title sheets etc**., as well as related **Tacheometric** files **DTM** files**, Contour** files **and Centre Line** files**.**

The SURPAC Clarke 1880 (Modified) to/from WGS 84 Transformation programme

This programme incorporates the same mathematical procedures as developed for the **SURPAC** Weighted Helmert Transformation programme. This uses the in-house Weighted Least Squares adjustment technique, employing the rigorous least squares adjustment of residuals. The residuals are determined from the weighted centres of gravity of the two sets of Control Stations, for each Point to be transformed.

This approach allows for full system to system transformation flexibility. The “number crunching” requirements of this technique are not a real problem for the modern PC. For example, running a Pentium IV 1.9Ghz PC, and opting for a point-by point weighted transformation, using the programme selected 8 nearest control Stations for each point, from a list of 250 common control Stations, it takes **SURPAC** about 0.4” to transform, check and store a 1500 point co-ordinate file.

This programme allows the User to make their own decisions on how to convert any survey from one of the two systems to the other.

Requirements for carrying out a Transformation Clarke 1880 (Modified) to/from WGS 84

1. The two **SURPAC** files called "**LoLatLonList.sur**" and "**WGLatLonList.sur**" must exist in the folder in which **SURPAC** Software is installed (usually the folder "**C:\Surpac98**"). These files are each about 1.1Mb in size. These files contain the double precision geographical positions (Latitude and Longitude) of about 38,000 common Control Points throughout the **Republic of South Africa**.

Important notes :
These files are random binary files and, as such, the data they contain are not printable, nor accessible to Users. Further, the data contained in these files have had variable, false origin shifts applied to them making the data meaningless even to someone who is able to "hack" their way into the files.

Anyone attempting to use data extracted from either of the two files is warned that highly inaccurate results will occur!! ***Keith W. Young*** *and* ***SURPAC Surveying Software*** *are not responsible, nor are they liable, for any damages or misinformation resulting from any misuse of these data.*

Since the common Points are stored in [**Lat**, **Long**] format, any Degree Square boundaries become irrelevant to the programme. Surveys can be located close to any Degree Square boundary, and the programme will still generate its own "Degree Square" of common Points, centered about the defined Survey. For surveys covering large areas the programme automatically modifies the centre position, and therefore the "Degree Square" of common Control Points, as the transformation progresses. This ensures that the transformation process always uses data that surrounds the Survey area.

Furthermore, the use of the [**Lat**, **Long**] format allows the programme to carry out transforms between different Central Meridians (for example, transforming from **Lo 27°** to **WG 29°**), or transforming from **UTM Zone 35** (on WGS 84) to **Lo 29°** (on Clarke 1880 (Modified)).

2. **Source data** which may derived form either of the following sources :-

- From manually entered [**Y**, **X**] or (**E**, **N**) **co-ordinates**
- From a **SURPAC Co-ordinate File**
- From an **ASCII** file containing **co-ordinate** data
- From an **ASCII** file containing [**Lat**, **Long**] data

3. The setting of the programme **Options**, namely :-

- The type of **Weighting** required (None, Inverse Distance or Inverse Distance Squared)
- The number of **Control Points** to use. The User can instruct the programme to search for the group of nearest common control Points for each Point to be transformed. A group of control Points can consist of between 2 and 20 Points.
- If a **SURPAC Co-ordinate File** has been selected as the **Source Data**, then the programme will search for the existence of any associated **CAD** files such as **General Plans**, **Working Plans**, **Sectional Title Sheets** and/or **Plot** files, that may need to be transformed. An appropriate Check Box will be displayed if any **CAD** files are found. By selecting this Check Box, all associated **CAD** files will be transformed, using the same transformation Options as set for the Co-ordinate file. Selecting this option provides a quick method of re-creating all the files in a survey, with the re-created file data being positioned, sized and oriented in the "New System".
- Finally, If a **SURPAC Co-ordinate File** has been selected as the **Source Data**, the programme provides the option of transforming any related files such as **Tacheometric** files, **Contour** Files, **DTM** files and **Centre Line** files. Again, these files, when specified, will be transformed using the User defined Option settings.

The Programme Form Layout

The displayed form will show a large co-ordinate **Grid** (initially empty) in which is used to display the **Source Data** co-ordinates and their transformed values in the current System.

Above this **Grid** is an array of **Input Boxes** used for entering manual co-ordinates, and for editing Points already transformed. Clicking on a Point in the **Grid** (after a transformation) will cause that Point's information to be displayed in the **Input Boxes**.

Above these **Input Boxes** is another **Input Box**, which can be used to enter, or to modify, the **Source Data** file **System** description (except in the case where the **Source Data** is a **SURPAC** Co-ordinate file), and a **Label Box** showing the **System** of the current Co-ordinate file.

Below the **Grid** are four **Option Lists**, showing the available options for **Selecting Source Data**, setting the **Point Weighting**, the number of **Control Points** to be used and the **Point Storing** Options.

These **Options** are :-

Source Data Entry Mode

- By **Manual** Co-ordinate Entry
- From a **SURPAC** Co-ordinate file
- From an **ASCII** Co-ordinate file
- From an **ASCII** [**Latitude**, **Longitude**] file

Point Weighting Option

- **Equal Point Weighting** (All used Control Points are given the same weight)
- **Inverse Distance** (Used Control Points are weighted according to the inverse of their distance from the Point being transformed.
- **Inverse Distance Squared** (Used Control Points are weighted according to the inverse of the square of their distance from the Point being transformed.

In summary :-

The **Equal Point Weight** Option will retain optimum figural consistency for the survey, but will tend to ignore localized control Point differentials.

The **Inverse Distance** Option will provide a weighted transformation, based on the position of each Point to be transformed. This weighting will cause shifting of the survey Points in sympathy with the differentials of close control Points and will, therefore, cause figural distortion.

The **Inverse Distance^2** Option will provide close to exact transformation of control Points, but will also create maximum figural distortion.

Control Points

- This option allows you to select the **number** of the nearest Control Points to be used for a transformation. This number may range from 2 to 20. Do not select 2 unless the are is very sparsely covered by Control Points. Normally a number such as 4, or 5 would be chosen.

Data Storing Options

- **Save to Co-ord File** (Transformed data are stored in the current **SURPAC Co-ordinate** File)
- **Save to ASCII File** (Transformed data are stored in a User designated format in an **ASCII** File)
- **Do Not Save Points** (Transformed Data are not saved in any format, but the results may be printed)

For example, if you just want to run the transformation to check the residuals (Standard Deviations), then select this last Option. Once you are ready to carry out the transformation and to store the transformed Points, then select either of the other two Options.

Below these **Option Lists** are four further **Options** that allow you to select or deselect :-

- **Transforming** any **Trigs or TSMs** in the **Source File** (normally deselected),
- **Including** any **Heights** and **Description elements** in the **Source File** (normally selected),
- **Changing** the **current File Description Lists** to that of the **Source File** (normally selected),
- **Transform** any **CAD** files **(GPs, WPs etc.)** associated with the **Source File**.

The programme will search for the existence of any **CAD** files associated with the **Source** Co-ordinate File (only if a **SURPAC** co-ordinate file is chosen as the **Source Data**). These **CAD** files include **General Plans**, **Working Plans**, **Sectional Title Sheets** and **CAD Plotting** Files. If any such files are located (in the **Source File** data folder) then the last of the above Options is made active and, therefore, selectable.

On the bottom right of the form are a series of **Function Buttons** whose functions are fairly self explanatory. These Function Buttons are made active, or inactive, depending on the chosen options and whether or not transformation data exist in the main co-ordinate **Grid**.

Finally, at the bottom left of the form, an **Option List** is available which allows the User to select any **Tacheometric** file, **Contour** file or **Horizontal Alignment** file whose data are to be transformed, based on the currently selected Option settings. This option is only active if a **SURPAC** Co-ordinate file has been selected as the **Source File**.

Carrying out a System to System Transformation using this Programme

Before calling the Programme open, or load, a **Co-ordinate File** which will become the current **Co-ordinate File**. In order to make this transformation programme appear as active on the "**Conversions**" Menu, the **System** of the current **Co-ordinate File** must include certain elements, as is described below.

For Transforming *FROM* Lo System *TO* WG System, the current Co-ordinate File System must include :-

- **Ellipsoid = WGS 1984**
- **Projection = RSA – WG System (Hartebeesthoek94 Datum), or**
  Projection = Universal Transverse Mercator (World System)
- **The WG System Central Meridian, or UTM Zone must pertain to South Africa.**

For Transforming *FROM* WG System *TO* Lo System, the current Co-ordinate File System must include :-

- **Ellipsoid = Clarke 1880 (Modified)**
- **Projection = RSA – Lo System (Cape Datum), or**
  Projection = Universal Transverse Mercator (World System)
- **The Lo System Central Meridian, or UTM Zone must pertain to South Africa.**

From the **SURPAC** "**Conversions**" Main Menu heading, select either the "**Transform Clarke 1880 Data to WGS84 Data**" item, or the "**Transform WGS84 Data to Clarke 1880 Data**" Item (obviously, only one of these menu items will be active at a time).

If either of the two **SURPAC** control files "**LoLatLonList.sur**" or "**WGLatLonList.sur**" is missing, you will not be allowed to proceed with the programme. These files must exist in the folder in which **SURPAC** is installed. If one of the files is missing, or damaged, you can download these by going to **www.surpac.co.za** and clicking the **"Download Upgrades"** button**.** (You need to have a current **SURPAC Maintenance Contract** to legally be able to do this!)

The flexibility of the programme allows for a variety of transformations between the **Clarke 1880 (Modified)** Ellipsoid (the **Cape Datum** in South Africa) and the **WGS 84** Ellipsoid (the **Hartebeesthoek94 Datum** in South Africa).

The following are examples of the types of transformations that may be carried out :-

- **Lo 27°to WG 27°**
- **Lo 27°to WG 29°**
- **WG 19°to Lo 19°**
- **WG 19°to Lo 21°**
- **UTM Zone 35 (Clarke 1880) to UTM Zone 35 (WGS 84)**
- **UTM Zone 34 (WGS 84) to UTM Zone 35 (Clarke 1880)**
- **UTM Zone 35 (Clarke 1880) to WG 27°**
- **UTM Zone 34 (WGS 84) to Lo 19°**
- **[Lat, Lon] (WGS 84) to Lo XX°(Clarke 1880)**
- **[Lat, Lon] (Clarke 1880) to WG XX°(WGS 84)**
- **[Lat, Lon] (Clarke 1880) to UTM Zone XX (WGS 84)**
- **[Lat, Lon] (WGS 84) to UTM Zone XX (Clarke 1880)**

The Programme will fill in the necessary headings, such as the ellipsoids and the "**To :**" file System. The System of the Source Data ("**From :**") will be left blank until you have identified the **Source Data** Entry Mode. From the **Source Data Entry Mode** Option List, select the required option. If you select an entry mode other than from a **SURPAC** Co-ordinate file, the programme will set a default file System for the **Source Data**. This can be modified by clicking on the "**From :**" System display and modifying it.

If you select any entry mode other than Manual entry, the programme will prompt for the name of the File from which the **Source Data** are to be read.

If you have selected a **SURPAC** Co-ordinate file as the **Source Data** then the System of the selected File will be loaded into the "**From :**" System display, and cannot be edited. If you have selected any other mode of **Source Data** entry, then make sure that the System shown in the "**From :**" System display is correct before proceeding.

If you have selected a **SURPAC** Co-ordinate file, an **ASCII** co-ordinate file or an **ASCII** [**Lat**, **Long**] file as being the **Source Data**, then after an appropriate file has been selected, the [**Compute File**] Button will become active.

If you have selected Manual Data Entry for the **Source Data** the [**Add a Point**] Button will become active.

Now check, and modify if necessary, the selections in the "**Point Weighting Option**", the "**Control Points**" and the "**Data Storing Options**" **List Boxes**.

Finally, check that any active Options (the ones shown in black) at the bottom of the form are correctly selected, or deselected.

If **CAD** files exist and you want these **CAD** files to be transformed, then select the **Transform any Associated CAD Files** Check Box.

Once all the Options have been set, click the [**Add a Point**] Button, in the case of **Manual Point Entry** for the **Source Data**, or click the [**Compute File**] Button for all other **Source Data** entry options.

The transformation of the file (or the entered Point) will be carried out and the results displayed in the co-ordinate **Grid**. The "**Display Current Point Parameters**" Button and the "**Print**" Button will become

active. If you have selected the current Co-ordinate file for the Data Storage, the transformed Points will be added to the current Co-ordinate file.

Displaying the Transformation Parameters for any Point

The **Transformation Parameters** for any Point transformed can be displayed by either double-clicking the required Point in the **Grid** display, or by highlighting the required Point and then clicking the "**Display Current Point Parameters**" Button.

Transforming Associated CAD Files

On completion of the Co-ordinate File transformation, the programme will proceed to transform all **CAD** Files associated to the **Source File** (if this Option has been selected), and to create corresponding, transformed **CAD** Files for the current Co-ordinate File.

Dimensional Data

Due to possible Scale and/or Orientation differences between the **Source File** and the **Current File**, it is possible that the dimension **Text Items**, such as **Directions** and **Distances**, on General Plans and Sectional Title Sheets may no longer be valid. The User is given the option, therefore, to suppress the transformation of these **Text Items**.

Transforming Ancillary Files

Finally, you may identify any **SURPAC Tacheometric** File, **Contour** File or **Horizontal Alignment** File for which co-ordinate data are to be transformed. The currently selected and displayed Control Files and the currently selected Options will be used for the transformation. When **Tacheometric** Files are transformed, any associated **DTM** Files area automatically transformed at the same time.
You will be prompted to select the File into which the transformed data will be stored. Normally, select a different Name for the new File to that of the **Source File**. If you want to overwrite the existing Source File data, give the New File the same name as for the **Source File**. Be careful with this option, however, as you may be overwriting data that may be needed in future.

When transforming any of these ancillary Files, it is important to take into consideration the **Constants** of the **Source File** and the **Current** File. Although Files such as Tacheometric Files do not have specific Constants, it is assumed by the programme that the (**Y**, **X**, **Z**) Constants of the defined Tacheometric **Source File** are the same as those for the Co-ordinate **Source File**, and similarly the Constants for the New Tacheometric File to be the same as for the current Co-ordinate File. This is necessary in order for the transformation parameters to be correctly applied to the data to be transformed.

2. Underground Peg Calculations – Displaying Peg Historical Information

For certain computation routines, **SURPAC** will record a short history of the multiple determinations of a Point's co-ordinates and fixing data. These data may be displayed, or edited, using the "**Edit Multi-Polar/Peg File**" programme, found under the "**General**" main menu.

These routines supported are Polars, Line Running, Splay Points, Apex Points, Intersections, Traversing and now the **Underground Peg Calculations**.

Up to 4 determinations of a Point's co-ordinates may be recorded, along with the Name of the Fixing Point, the Distance and Direction used, the Field Book Page, the Calculation Page and the Date.

Over and above the calculated co-ordinate values for each determination, the programme will display the currently adopted co-ordinate values for the Point.

The **Multi-Polar/Peg File** for a **Co-ordinate File** is given the name ***.wdp** (where *** represents the name of the current **Co-ordinate File**) . There is also a smaller file having the extension ***.wdx** which contains extended information.

Apart from showing a history of multiple determinations of a Point, the **Multi-Polar/Peg** File is used to ensure that the mean values of a Point are the correctly weighted averages, determined by using all of the available determinations of a Point's co-ordinates. The weighting is based on the inverse of the distance from the Point to the respective fixing Points. For example, if a Point has been determined from two Points/Stations, then its mean co-ordinates would be the weighted average, with the determination from the closer of the two fixing Points/Stations being given the more weight. If, at some later stage, a

third Polar is computed to the Point, from a third fixing Point/Station, the programme will take the two existing **Multi-Polar/Peg** determinations, plus the new determination, and use these three sets of co-ordinates to compute a new weighted average of the Point's co-ordinates.

Using the Multi-Polar/Peg facility for Underground Peg Calculations

The **Editing a Multi-Polar/Peg File** programme has specific functions applicable to the monitoring of historical **Underground Peg Calculation** data.

When an **Underground Peg Calculation** takes place (using either the **Double Set-Up** method or the **Double Button** method), the User is given the option of saving all the Peg observational data into an **ASCII** file. These specific **ASCII** files have the extension of either "*****.pg1**" (for a **Double Set-Up** calculation), or "*****.pg2**" (for a **Double Button** calculation). All information, both observed and derived, relative to the Peg being calculated is stored in this **ASCII** file. Apart from acting as an historical record, this **ASCII** file may be imported and used to re-compute the Peg at any future time.

The **Multi-Polar/Peg** File may be used to view both the **summary** of a the result of a Peg calculation, and also for viewing the **full details** of the Peg calculation by displaying the relative **ASCII** file.

To **View an ASCII Peg File for an Underground Peg**, when running the "**Edit Multi-Polar/Peg File**" programme, click on any part of the Grid Line that contains the **Name** of the required **Point/Peg**. The programme will then display the names of all the existing **SURPAC ASCII** Peg Files (file of type *****.pg1** or *****.pg2**) in the currently defined Data folder, and whose file names contain the name of the Point defined.

NB : When an **ASCII** file is created using one of the **Underground Peg Calculation** programmes, the file is, by default, given a name like "**E5798 [30-07-02]**", where **E5798** is the **Peg's Name** and **30-07-02** is the User given **Date** for the calculation (normally the date the observations were made). Users may modify these file names, but the file name should always contain the name of the Peg in order for this function to work correctly. Further, leaving the date as displayed will make identification as to which **ASCII** file relates to which Point determination a lot easier when using this programme.

In the "**Edit Multi-Polar/Peg File**" programme, a Point/Peg determination may only be deleted if the correct **Password** is given. This is to prevent any unauthorized removal of Peg information. This is the same security **Password** as required (an possibly modified) for the **Underground Peg Calculation** programmes "**Set Limit**" security feature.

The default security code is **ABCD1234**

Supervisors are advised to change this security code to their own required value after installing the software. **Any alphanumeric code of up to 8 characters may be used**.

3. Diagram CAD Programme – Improved Diagram Creation Options

When creating a **New Diagram** by defining **Points** (or **Line Terminals**) and the surrounding data from a **General CAD Sheet**, or on a **Working Plan Sheet**, a new form is now shown at the bottom left hand corner of the screen.

This form displays the currently selected Points for the **Diagram**, along with their co-ordinates and figural polar data. Apart from the **Diagram** designation of a Point (**A**, **B**, **C** etc.), the Point's actual **Name** will also be displayed, allowing you to verify that the correct Point has been selected.

In the event of an incorrect Point selection, use the **Mouse [RHB]** to de-select the last Point from the **Diagram** figure. This option may be repeated for as many times as there are Points selected.

In summary, when defining Points for a **Diagram** on a **CAD** Sheet or a **WP** Sheet :-

- Clicking the **Mouse [LHB]** will **select** the Point closest to the cursor as the next **Diagram** figure Point.
- Clicking the **Mouse [RHB]** will **de-select** the last displayed Point from the **Diagram** figure.

- Pressing the keyboard **[Esc]** key will provide the option of de-selecting the last **Diagram** figure Point, or of **Aborting** the **Diagram** construction and returning to the **Diagram** Programme.

4. General CAD Programme – Programme enhancements

4.1 Using Pen 8 (Colour Grey) as a BackGround Layer

All Data drawn with **Pen 8** (**Colour Grey**), or that have been imported into **Pen 8**, may be set as being "**BackGround**" Data. These data are visible (in grey) but are not treated as being "active". They provide a visible background of information that can act as a reference and/or comparison to the actual (non-Grey) information being constructed, or edited.

NB : Graphic Images may also be scaled and positioned so as to provide a true background of information. Scanned Orthophotos are very useful for this purpose.

When importing data from a **DXF** file, or from another **SURPAC** Sheet (e.g. **General Plan**, **Working Plan** etc.) the options now exist to import these data directly into **Pen 8** (**Grey**). Setting the "**BackGround**" option as **ON** will then make all these data as being **BackGround** only.

Selecting/Deselecting the **BackGround** option is done by either pressing the **[F11]** Key, or by clicking the appropriate menu item found under the Programme's **General** main menu heading.

When the **BackGround** option is **ON**, all **Lines**, **Arcs**, **Circles** and **Text Items** that are drawn using **Pen 8** (**Grey**) will remain visible, but be non-active. The only functions, or Commands that will remain active for **Pen 8** data will be the **[LD] – Line Dimension** and **[LIC] – Line Parallel Check** Commands.

The **BackGround** option can be toggled **ON/OFF** by pressing the **[F11]** key.

This function can be very useful, for example, when planning information is to be imported from a **DXF** file, and when a mathematically correct layout is to be constructed, based on the imported **DXF** information. In this case, when importing the data, set all **DXF** Layers to be imported into **Pen 8** (there is an Option on the **DXF** Import form that will automatically do this, if required). After the importing is complete, select the "**BackGround**" option as **ON** by pressing the **[F11]** key.

For data that already exists on a **General CAD Sheet**, use the **Reset Line Attributes** and **Reset Text Attributes** Commands to change required data to **Pen 8** (for speed, use the global "Change All Lines of this type" when resetting Lines).

4.2 Changing the Associated Co-ordinate File

Whenever a **General CAD Sheet** is created, it is immediately "associated" with the current **Co-ordinate File**. In other words, the **Point** data will be that contained in the current **Co-ordinate File**.

Sometimes, however, it is required to keep a **CAD Sheet's Line**, **Text** information etc. intact, but to relate this information to some other **Co-ordinate File**.

In order to change the **Associated Co-ordinate File** for a **General CAD Sheet**, click the Programme's "**Edit**" main menu heading and then select the "**Change Associated Co-ordinate File**" item. From the displayed **Open File** form select the required **Co-ordinate File**.

The **CAD Sheet's** position, size and contained Items will not change. If the new **Co-ordinate File** does not overlap the **CAD Sheet**, no **Points** (as defined by **Mark Points**) will be displayed.

4.3 New function – Line Bisect

To create a **Line bisector**, do the following :-

- Move the cursor close to the **Line** for which a **Bisector** is to be created
- From the "**Draw**" main menu heading, select the "**Line Bisect**" Item, or give the keyboard Command **[LB]**.

- A **Bisector** will now be created, using the same **Pen Colour**, **Line Style** and **Line Thickness** as the parent **Line**. This Bisector is a standard **Line** Item.

4.4 New function – Construct a Double Headed Arrow

To draw a **Double Headed Arrow**, do the following :-

- Select the required **Pen Colour** and **Line Thickness** (the line **Style** will default to **Solid**)
- From the "**Draw**" main menu heading, select the "**Draw a Double Arrow**" Item
- Move the cursor to the required starting position (no snapping will take place) and click the **Mouse [LHB]**,
- Move to the required end position and click the **Mouse [RHB]**.

4.5 New function – Figural Area Calculation by User Point Selection

Areas may be computed automatically, using the graphic line location technique, by pressing the keyboard **[A]** key, or by selecting this item from the "**Draw**" main menu. However, sometimes this method cannot be used due to a complexity of Lines, or other **Sheet** information. The function described below can be used for any User defined figure, whether Lines exist or not.

To compute a **Figural** (**Polygon**) **Area** by Point selection, do the following :-

- Set the required co-ordinate accuracy (2 - 4 places) for the calculation, by either selecting the "**Set Line Write Options**" item from the "**Edit**" main menu heading, or by simultaneously pressing the keyboard **[Ctrl]** and **[O]** keys
- From the "**Draw**" main menu heading, select the "**Area (by Point Selection)**" Item, or simultaneously press the keyboard **[Ctrl]** and **[A]** keys.
- The cursor will now change to the blue "**Point Digitise**" cursor.
- Move the cursor close to the first required **Point** (or **Line terminal**) for the figure, or polygon, and click the **Mouse [LHB]**.
- The display line at the top of the screen will show the **Name** of the selected **Point** (unless a Line terminal was chosen).
- Move the cursor close to the next required **Point**, and again click the **Mouse [LHB]**.
- Continue in this fashion, selecting all required **Points**, and finally closing the figure by re-selecting the original starting **Point**.
- The figure **Area** will be shown in the display line, near the top of the screen.
- To Abort the calculation at any stage, press the **[Esc]** Key.

In summary, when defining Points for an **Area** calculation by **Point Selection** :-

- Clicking the **Mouse [LHB]** will **select** the Point closest to the cursor as the next figural Point.
- Clicking the **Mouse [RHB]** will **de-select** the last displayed figural Point.
- Pressing the keyboard **[Esc]** key will provide the option of de-selecting the last figural Point, or of **Aborting** the **Area** calculation.

5. Cadastral General Plan Programme – Programme enhancements

5.1 New function – Construct a Double Headed Arrow

To draw a **Double Headed Arrow**, do the following :-

- Select the required **Pen Colour** and **Line Thickness** (the line **Style** will default to **Solid**)
- From the "**Line**" main menu heading, select the "**Draw a Double Arrow**" Item
- Move the cursor to the required starting position (no snapping will take place) and click the **Mouse [LHB]**,
- Move to the required end position and click the **Mouse [RHB]**.

5.2 New function – Stand/Erf Area Calculation by User Point Definition

Areas may be computed automatically, using the graphic line location technique, by pressing the keyboard **[A]** key, or by selecting this item from the "**Data** main menu. However, sometimes this

method cannot be used due to a complexity of Lines, or other information. The function described below can be used for any User defined figure, whether Lines exist or not.

To compute a **Stand/Erf Area** by Point definition, or selection, do the following :-

- If the Stand/Erf number has already been written on the **GP** sheet, then move the Cursor close to this Text Item to enable the programme to "lock" on to it as the default Stand/Erf number for the **Area** storage.
- From the "**Data** main menu heading, select the "**Area by Point Definition**" Item, or just simultaneously press the keyboard **[Ctrl]** and **[A]** keys.
- The usual form requesting User response related to the Stand/Erf number, the area storage etc. is then displayed. Make the required selections, and ensure that the appropriate co-ordinate (distance) accuracy is set (near the bottom of the form). Regardless of selection, the minimum accuracy used is 2 decimal places and the maximum is 4.
- On this same form, you can select, or de-select, the display of the **"Point Definition" Information** Form. It is useful to have this form displayed as it shows not only the selected Points, but also the Stand/Erf line data.
- Click the **[OK]** Button on the form, and the cursor will now change to the blue "**Point Digitise**" cursor.
- Move the cursor close to the first required **Point** (or **Line terminal**) for the Stand/Erf and click the **Mouse [LHB]**.
- If selected, the "Point Definition" Information form will be displayed at the bottom left corner of the screen, showing the first Point's Name and co-ordinates.
- Move the cursor close to the next required Point, and again click the **Mouse [LHB]**. The "Point Definition" Information form will display this Point's information, plus the polar data (derived from the co-ordinates) from the previous Point to the current Point.
- Continue in this fashion, selecting all required Points, and finally closing the Stand/Erf by re-selecting the original starting Point.
- The Stand/Erf **Area** will be shown on the "Point Definition" Information form. By selecting the appropriate Button on this form, it is possible to send the displayed data to the **Printer**, or to a defined **ASCII** file.
- To **Abort** the calculation at any stage, press the **[Esc]** Key, or click the **[Abort]** Button on the "Point Definition" Information form.
- To **cancel** the last selected **Point**, click the **Mouse [RHB]**, or click the appropriate Button on the "Point Definition" Information form.

In summary, when defining Points for an **Area** calculation by **Point Definition** :-

- Clicking the **Mouse [LHB]** will **select** the Point closest to the cursor as the next Stand/Erf Point.
- Clicking the **Mouse [RHB]** will **de-select** the last displayed Point from the Stand/Erf.
- Pressing the keyboard **[Esc]** key will provide the option of de-selecting the last Stand/Erf Point, or of **Aborting** the **Area** calculation.

Modifications made to SURPAC Version 5.06, Release 01

1. Diagram CAD Programme – Support for A0, A1, and A2 Sheet sizes

The **Diagram** programme now allows for the construction of **Diagrams** ranging in size from an **A4** (**Portrait** orientation only), a double sheet **A3** (**Landscape** orientation only), plus **A2**, **A1** and **A0** sheets. The latter three sheet sizes may have the orientation set as either **Portrait** or **Landscape**.

Creating a New Diagram
From the programme's "**File**" menu heading, select the "**Generate Diagram Figure & Information**" menu item.

From the form that will then be displayed it can be seen that there are 5 ways in which a new **Diagram** may be created. These are :-

Create Diagram Information using Co-ordinate File Points

Create Diagram Information using current CAD Plot Sheet

Create Diagram Information using the current Working Plan

Generate Diagram from a "SURPAC" type DXF File

Generate Diagram from an "AllyCAD" type DXF File

Apart from selecting the **Diagram** Creation, or Generation, option you also need to set various other available options. These are :-

- Set the **Diagram** sheet **Orientation** (only available for **A2**, **A1** and **A0** sheet sizes),
- Set the required Diagram Font to be used. (Recommended fonts are either **Arial** (variable width font) or **Monospac821 BT** (fixed width font),
- Select the required **Text Styling** (Regular, *Italic*, **Bold** or ***Bold Italic***),
- Set the **Diagram sheet Margins** (only available for **A2**, **A1** and **A0** sheet sizes),
- Set the Standard **Text Size**,
- Set the Standard **Point Circle Size** and finally,
- When using the **Diagram** creation from a **CAD Plot** Sheet, or a **Working Plan**, select or deselect, the options for importing **surrounding Lines** and **surrounding Text** Items around the identified figure.

Whether the **Diagram** Points are identified from a Plan, or from a List, this programme will use the **Beacon** values currently stored on the defined **Co-ordinate file** to compute the **Diagram** data. When generating a **Diagram** from a **DXF** file, all data and Co-ordinates are read from the **DXF** file, and are not related to values stored in the defined **Co-ordinate file**

A **Diagram** may consist of up to 1000 **Text** Items, 2000 **Lines** and **300** Points as well as any User added **Image** files.

Notes :

When constructing the **Main Figure Data** the lettering sequence employed goes **A.....Z**, then **A1....Z1**, **A8….Z8**, **A9….Z9**, but omitting the values **I**, **O**, **I1**,**O1 …….I9**,**O9**.

When using Sheet sizes of **A2**, **A1** or **A0**, and using the using the method of Point selection from the list of Co-ordinate File Points, the **Diagram** programme will first check to see if the Co-ordinate File contains a set of Point Names, that starts from **A** and which then runs through the alphabet (including the **A1....Z1**, **…… A9….Z9** sequences).
If such a set of Points is found, you will be given the option of adopting these Points as the **Main Figure Data** for the **Diagram**. The reasoning is that for large **Diagrams**, the outside figure of a Township is often required as being the **Main Figure** itself. Using this option can save a lot of data entry, or Point selection, when large figures in excess of 100 Points are required.

2. Support for the Nikon NPL 300, 350, 500 and 800 Series Total Stations.

SURPAC now supports the **downloading** of **Observations** and **Co-ordinates**, plus the **Uploading** of **Co-ordinates** to/from the above **Nikon** Total Stations.

2.1 Receiving Observations from a Nikon NPL-300/350/500/800 Total Station

Data Structuring required for SURPAC General Observation Files

Downloaded Observation Data should, as far as possible, conform with the **SURPAC Observation Code** Format used for all **General Observation Files** . Apart from the normal observation entities (such as Horizontal Angle, Vertical Angle, Slope Distance Instrument Height, Target Height), each Set-Up Point and Sighted Point requires a Point Name/Number, a Point Description Code and an Observation Code.

SURPAC must be able to determine, from the Observation Codes in an Observation File, whether a Station/Beacon is a **Fixed Point** or a **Free Point**. As **SURPAC** is able to utilize **General Observation Files** to automatically configure and run Least Squares Control Networks, Traverses, Single Point Fixes, Tacheometric Reductions and Mass Polar Calculations, it has to ascertain all configural information (Set-ups at **Free Point** or **Fixed Point**, Observations to **Free Points** or **Fixed Points** etc.).

SURPAC Observation Codes

SET-UPS

Set-Up Code (1 or 2), with the following meanings :-

Code 1 - Defines a Set-Up at a Point with unknown co-ordinates. E.g. a **Free Point**
Code 2 - Defines a Set-Up at a Point with known co-ordinates. E.g. a **Fixed Point**

OBSERVATIONS

Observation Code (3 to 9), with the following meanings :-

Code 3 - Defines a data line used to fix a Control Set-Up Point
Code 4 - Defines an Orientation observation
Code 5 - Defines a Polar or Tacheometric fixing data.
Code 6 - Defines a data line used to fix a Control Point
Code 7 - Defines a Back Check Observation for an U/Ground Peg Fix
Code 8 - Defines a Set-Up Peg to New Peg Observation for an U/Ground Peg Fix
Code 9 - Defines a New Peg to Set-Up Peg Observation for an U/Ground Peg Fix

Determining SURPAC Observation Codes from a Nikon NPL- 300/350/500/800 Total Station

The **Nikon NPL- 300/350/500/800 Total Stations** only allow for the input of a single Code block. As this Code Block in the Instrument is referred to as the “Description Code”, this function has been maintained when transferring data to a **SURPAC** Observation File. Users are reminded that in **SURPAC** a **Point Description Code** is a number in the range 0-499, or an alphanumeric value of up to 6 characters.

As there is no direct transfer of an **Observation Code** from these **Nikon** Instruments, **SURPAC** has to use the approach of comparing the Names of downloaded Points with those of Points existing in the current **Co-ordinate File** in order to attach the most logical Observation Code to each data line.

This works as follows :-

For Set-Up data lines, the programme will search the current Co-ordinate File to see if the Named Set-Up Point already exists. If it does then the Observation **Code 2 (**Set-Up at a Point with known co-ordinates. E.g. a **Fixed Point**) will be allocated. If the Point does not exist then the Code 1 (Set-Up at a Point with unknown co-ordinates. E.g. a **Free Point**) will be allocated.

For Observation lines, the programme will also search the current Co-ordinate File to see if the Named observed Point already exists. If it does then the Observation **Code 3** will be allocated. If the observed Point does exist, then the **Code 3** (data used to fix the Set-Up Point will be allocated. If the observed Point does not exist, a **Code 5** (Polar or Tacheometric fixing data) will be allocated.

When using a **Nikon NPL- 300/350/500/800 Total Station** the **Comms** Settings should be :-

BAUD	**: 9600 BPS (May be any value 19200 to 4800)**
PARITY	**: NONE**
DATA BITS	**: 8**
STOP BITS	**: 1**

And the Data Transfer method must be set to **NIKON** and **RAW**

Accessing this Data Transfer facility in SURPAC

- In the **Main Menu Bar**, Click the Heading **Topographical**. Then, from the displayed Menu, click the Item **General Observation File Load/Edit**.
- Load the required **General Observation File** (or Open a new File).
- At the Top Left corner of the displayed Programme form click the **LOAD Data Button**.

The displayed downloading form allows for the setting of the logger's data transfer parameters when the **Set Parameters Button** is clicked, or selected.

Downloading Observations from the Nikon NPL- 300/350/500/800 to SURPAC

- Make sure that the instrument is correctly connected to the **PC** via an **RS232C** cable, and plugged into the correct port.
- In **SURPAC**, select the required **Nikon NPL- 300/350/500/800** Total Station from the list of available Loggers/Total Stations.
- Use the **Set Parameters Button** to set, or check the transfer parameters. These should be :-

Connection Port	**: COM2 (or the appropriate Port number)**
Baud Rate (BPS)	**: 9600 BPS (May be any value 19200 to 4800)**
Data Parity	**: None**
Data Bits	**: 8 Bits**
Stop Bits	**: 1 Bit**
Flow Control	**: Hardwire**

- Click the **Load Data Button**. (**SURPAC** will now be waiting for the incoming data)
- On the **Nikon NPL- 300/350/500/800**, set the Data Transfer method to **NIKON** and **RAW** and the select the **Comm** command to start the downloading process.
- Once data transmission begins, the programme will display the number of bytes that have been received from the Total Station. Once the complete file has been transmitted, the programme will commence to translate the byte information into Observation data that are then stored in the currently defined **General Observation File** .
- The maximum number of lines that may be transferred at one time is 3000.

2.2 Receiving Co-ordinates from a Nikon NPL-300/350/500/800 Total Station

Accessing this Data Transfer facility in SURPAC

- In the **Main Menu Bar**, Click the Heading **General**. Then, from the displayed Menu, click the Item **Co-ordinate File Editing**.
- At the Top Left corner of the displayed Programme form click the **Options Button**. A new, smaller, form will be displayed, showing the available Options.
- Click the **Load Data from an Electronic Field Book** Option, and then click the **OK Button**.

The displayed downloading form allows for the setting of the logger's data transfer parameters when the **Set Parameters Button** is clicked, or selected.

Downloading from the Nikon NPL-300/350/500/800 Series to SURPAC

- When using a **Nikon NPL-300/350/500/800 Series Total Station**, the **Comms** Settings should be as follows :-

  BAUD : 9600 BPS (May be any value 19200 to 4800)
  PARITY : NONE
  DATA BITS : 8
  STOP BITS : 1

- Make sure that the Total Station has the same transfer parameters as set in **SURPAC**.

- On the displayed **SURPAC** form, select the required **Nikon NPL-300/350/500/800 Series** from the available list of Loggers/Total Stations, and then click the **Load Data Button**.

- **SURPAC** will now be ready to receive the co-ordinate data to be downloaded. **SURPAC** will wait in this mode until the data downloading starts, or until the routine is aborted.

- In **SURPAC**, select the **Set Parameters Button** and set, or check, the following options :-

  Connection Port : COM2 (or the appropriate Port number)
  Baud Rate (BPS) : 9600 BPS (May be any value 19200 to 4800)
  Data Parity : None
  Data Bits : 8 Bits
  Stop Bits : 1 Bit
  Flow Control : Hardwire

- On the **Nikon NPL- 300/350/500/800**, set the Data Transfer method to **NIKON** and **RAW** and the select the **Comm** command to start the downloading process.

- Once data transmission begins, the programme will display the number of bytes that have been received from the Total Station. Once the complete file has been transmitted, the programme will commence to translate the byte information into co-ordinate data that are then stored in the currently defined **Co-ordinate File** .

- The maximum number of lines that may be transferred at one time is 3000.

2.3 Sending Co-ordinates to a Nikon NPL-300/350/500/800 Total Station

Accessing this Data Transfer facility in SURPAC

- In the **Main Menu Bar**, Click the Heading **General**. Then, from the displayed Menu, click the Item **Co-ordinate File Editing**.

- At the Top Left corner of the displayed Programme form click the **Options Button**. A new, smaller, form will be displayed, showing the available Options.

- Click the **Send Data to an Electronic Field Book** Option, and then click the **OK Button**.

The displayed downloading form allows for the setting of the logger's data transfer parameters when the **Set Parameters Button** is clicked, as well as for Sending the data.

- When using a **Nikon NPL-300/350/500/800** Series Total Station, the **Comms** Settings should be as follows :-

  Baud Rate (BPS) : 9600 BPS
  Data Parity : None
  Data Bits : 8 Bits
  Stop Bits : 1 Bit

- Set the **Nikon** in the mode necessary to **Receive Data**

- In **SURPAC**, the ***Send Co-ordinate Data to a Logger/Instrument*** form should be shown.

- From the list of available Loggers/Total Stations, select the **Pentax PCS 300** Series Total Station. Then select the **Set Parameters Button** and set, or check, the following options :-

  Connection Port : COM2 (or the appropriate Port number)
  Baud Rate (BPS) : 9600 BPS (May be any value 19200 to 4800)
  Data Parity : None
  Data Bits : 8 Bits
  Stop Bits : 1 Bit
  Flow Control : Hardwire

- On the displayed **SURPAC** form, click the **Send Data Button**. **SURPAC** will now query if the **Nikon** is "***Ready to Receive Co-ordinate Data***".

- Click the **Yes Button**.

- Once **SURPAC** has started to transmit co-ordinate data, it will display the **Point Names** as they are being transmitted.

- On completion, **SURPAC** will return you to the normal display of co-ordinates of the **Co-ordinate File Editing** Programme.

3. The U.K. National Grid (OSGB36) – OSTN02 and OSGM02 Compatibility.

SURPAC now offers full support for the new **OSTN02** and **OSGM02** data shift files, as supplied by **Ordnance Survey**, **UK**. These data are used for transformations to/from the **OSGB36** System (**Airy 1830** Ellipsoid) and the **ETRS89** System (**WGS 84** Ellipsoid).

OSTN02 and OSGM02 Compatibility : The National Grid to ETRS89 and the ETRS89 to National Grid conversions in SURPAC use algorithms and shift data provided by the U.K. Ordnance Survey, and are fully OSTN02 and OSGM02 enabled. In order to use these transformations, however, the files called "OSTN02.DAT" (for Eastings, Northings) and "OSGM02.DAT" (for heights) must exist in the SURPAC application folder. (These files are in a compacted SURPAC format, and are not in the same format as those issued by Ordnance Survey.)

Users in the UK need to download these files from www.surpac.co.za

Modifications made to SURPAC Version 5.06, Release 02

1. Diagram CAD Programme – modifications

1.1 The problem with ”Line Servitude” diagrams has been fixed. Previously, multi-line line servitudes were being truncated to display only the first two lines.

1.2 Previously, Text items on A3 diagrams (in particular) were difficult to move once the Figure had been swung. The programme has been modified so that any Text items written at 270°, or 0°, remain unchanged, when swinging the Figure. This can sometimes result in a Text item being positioned in what has now become an incorrect position (e.g. a Name of a contiguous Stand), but this can easily be rectified by using the "**WM**" (Write Move) command. Overall, the new method of leaving 270°, and 0°, oriented Text items unchanged, regardless of Figure swing, appears to provide for easier editing than did the previous method.

1.3 When re-loading Diagrams that were generated prior to **SURPAC Version 5.06**, the Text Items (including the Data block etc.) can appear to be printed using some non-standard font. If this happens, do the following :-

- Exit from **SURPAC**, then Delete the file called "***.ita**" from the data folder (where *** is the diagram Name).
- Run **SURPAC**, return to the **Diagram Editing** programme, and re-load the required Diagram.
- From the programme's "**Text**" menu, select the "**Reset Attributes**" function. Do not change any of the default settings, except for clicking the "**do you want a new font ..**" checkbox, and selecting the required font. The Diagram should now be re-displayed using the chosen Font.

2. Downloading and Uploading Leica 16 Bit data files

SURPAC will now download **Leica** 16 Bit data, as well as the 8 Bit format. This applies to both Observations and Co-ordinates. 16 Bit Co-ordinate files may now be generated for sending directly to a **Wild**/**Leica** instrument or logger, or to an **ASCII** file.

When downloading, the relevant programme can automatically identify whether the incoming data is in 16 Bit, or 8 Bit format. For Uploading, the User is given the choice of using either the 16 Bit, or 8 Bit format.

3. Downloading from the Topcon GTS 200/2120/500/700 Series

The previous release of **SURPAC** contained a “bug” in these routines. When downloading, the programmes either reported a “division by zero” error, or only downloaded the Setup and Orientation observation lines. This problem has now been corrected.

4. Sectional Title CAD Programme – modifications

4.1 The usage of Sub-Areas has been extended, allowing the Main, or parent, Area to be on one Sheet, and the Sub-Areas on any of the other Sheets. Previously, the Main Area and all Sub-Areas had to all be on the same Sheet.

4.2 When Sub-Areas are combined with the Main Area, the Main Area will include all Sub-Areas and the Sub-Areas will be deleted from the relevant sheet(s).

4.3 A Participation Quota Sheet will not be generated if the programme detects the presence of Sub-Areas which have not been combined with their respective Main Areas. When this occurs, you will be prompted to combine all Areas, if you want to proceed with the PQ Sheet construction.

4.4 In the previous versions, the area totals were not always adding up to 100.0000% on a Participation Quota Sheet. On some Sheets, a manual addition actually showed totals of, for example, 100.0002%, or 99.9999%.This has now been rectified.

5. Tacheometric Files – modifications

A new option has been added to prevent the duplication of data in a **Tacheometric** file. It can happen that when two or more files are merged, for example, the resulting file can contain a duplicate set of information. In other words, assume a group of Points is merged into a file and given numbers, say 25-48. Subsequently, another file is merged, with their number being from 389 to 524.

If the second file merged happens to already contain the previously mentioned Points 25-48, but with different numbers, this would result in two sets of Points, having different numbers, but containing the identical [Y, X, Z] data. A file like this causes serious problems when trying to use the file for the generation of surface triangles, for contouring and/or a DTM.

You can now use the **[Options**] button in the **Tacheometric Editing** programme to **Locate and Delete Duplicate Points**. The programme allows you to set a search limit (default = 0.05m) and then Delete any duplicate Points found in the file.

6. General CAD Drawing Programme – modifications

6.1 The function for setting up **links** between **Mark Points** and **Point Descriptions** has been improved. For example, if you have made a change to an existing link, or you have created a new link, the programme will prompt you to Save this change/addition before moving on. Previously, if you had not Saved a change, or addition, the link would be lost when you moved on to edit/create the next one.

6.2 An new option is included which enables you to specify whether or not the **Point Name** is to be shown when a **Mark Point** is linked to a **Point Description**.

6.3 The "**Mass Lines to Points**" function has been modified. It now allows you to specify the Description code you want to allocate to the newly created Points. It also runs a lot faster than before.

7. Converting [Lat, Long] ASCII Files to U.T.M. Co-ordinates - modification

The **SURPAC** routine for converting the Geographical **[Lat**, **Long]** values to **U.T.M.** system co-ordinates from an **ASCII** file contained a problem. This problem has now been repaired.

Modifications made to SURPAC Version 5.06, Release 03

1. Locate and Add the Nearest Trig. and/or TSM Beacons for a File

This new programme provides the facility of locating a set of the nearest **Trigonometrical Beacons** and/or **Town Survey Marks** (**TSM**s) to a User defined geographical position.

If required, the located set of Points may be added to the current **Co-ordinate File**.

Currently, this programme is limited to the geographical area of the **Republic of South Africa**, and to surveys defined as using either the "**Lo**" (Clarke 1880 (Modified) Ellipsoid) System, or the "**WG**" (WGS 84 Ellipsoid) System, (also referred to as the "**Cape Datum**" and the "**Hartebeesthoek94 Datum** systems, respectively).

It is not necessary of the User to define any source file for the location of the Trig. Beacons, or TSMs. **SURPAC** has two built in Source Files called "**LoLatLonList.sur**" and "**WGLatLonList.sur**" which must exist in the folder in which **SURPAC** Software is installed (usually the folder "**C:\Surpac98**").
NB : These are the same two files as used by the **SURPAC** "**Lo**" to/from "**WG**" transformation programme.

Each of the above Source Files contains the double precision geographical positions (Latitude and Longitude) of about 38,000 Points throughout the Republic of South Africa, in the "**Lo**" (Clarke 1880 (Modified) Ellipsoid) and "**WG**" (WGS 84 Ellipsoid) respectively. Should you not have these Source Files already loaded on your PC, or Laptop, you may download them from the "Upgrade" section of the **SURPAC** Internet site.

This programme will automatically search and extract the "**Lo**" or "**WG**" Point information from the appropriate Source File.

> **Important notes** :
> The above mentioned **SURPAC** Source Files are random binary files and, as such, the data they contain are not printable, or accessible to Users. Further, the data contained in these files have had variable, false origin shifts applied to them making the data unusable, even to someone who is able to "hack" their way into the files.
>
> Anyone attempting to use data extracted from either of the two files, other than through an appropriate **SURPAC** programme, is warned that highly inaccurate results will occur!!
> **Keith W. Young** and **SURPAC Surveying Software** are not responsible, nor are they liable for any damages or misinformation resulting from the use of these data.
>
> Since these Source File Points are stored in shifted [**Lat**, **Long**] format, any Degree Square boundaries become irrelevant to the programme. Surveys can be located close to any Degree Square boundary, and the programme will still generate its own "Degree Square" of Points, centred about the Survey, or any defined Point in the Survey. Data may be drawn from different Degree Squares for any given Survey.

The programme offers User options for both the selection of Points, and the display mode, namely :-

- The **Search Centre position** may be User selected,
- The located Points may be either **Trig. Beacons**, **TSMs**, or **both**,
- The **number of locate Points** displayed may be set according to a required **maximum number**, or a required **maximum search radius**,
- The **display of located Points** may be in order of **Distance**, **Direction** or **Point Name**,

- Any of the **located Points** in the displayed list may be tagged as "**not required**", to prevent them from being added to the Co-ordinate File,
- Any **located Point** in the displayed list may have its **Degree Square**, **Latitude** and **Longitude** shown on a sub-display, for identification purposes,
- An **output** of the displayed list of located Points may be made to the **Printer**, an **ASCII** file or the **Clipboard**, and
- The **located Points** in the displayed list, marked as "**required**" (i.e. the ticked Points) may be **added** to the current **Co-ordinate File**.

This programme may be loaded in any of three different ways, namely :-

1. From the main **Conversions Menu**, select the **Locate and Add Nearest Trig/TSM Beacons** Menu Item, or
2. In the **Co-ordinate Editing Programme**, click the Mouse RHB and from the displayed "pop-up" Menu, select the **Locate and Add Nearest Trig/TSM Beacons** Item, or
3. In the **Co-ordinate Editing Programme**, click the **[Options]** Button, select the **Locate and Add Nearest Trig/TSM Beacons** option and then click the **[OK]** Button.

If the current **Co-ordinate File** is empty, the programme will display a warning message and abort. The Co-ordinate File must contain at least one Point in order for this programme to work.

The Co-ordinate File should have appropriate constants set. If no constants are used, then both the Y an X ordinates must have full values.

2. Mining Menu : Peg Calculation - Double Back Fix Method

This new programme is designed to handle a number of Peg Fixing and/or Checking functions for the Mine Surveyor.

The main difference between this programme and the previous Double Set-Up and Double Button Methods, is that the Peg to be fixed, or checked, is the Set-Up Peg itself.

This programme can be used, for example, for the following functions :-

- Determining the **[Y, X, Z]** values for any new Peg, from which two other fixed Pegs can be seen. This method has the advantage that the Surveyor can determine where he wants to put a new Peg, place the Peg, set up under it and then fix the Peg (using this method), without having to set up at any other Peg.

- Checking the **[Y, X, Z]** values for any existing Peg, from which two other fixed Pegs can be seen. When checking an existing Peg, this method provides a convenient and full technique for verifying the relative positions of the Set-Up Peg and the two sighted, Back Pegs.

- Calculating the **[Y, X, Z]** values for a Peg on a new Inter connected by a Raise to a lower Inter. This method fixes the new Peg from twin Pegs established over the Raise and whose plumb lines can be sighted from both Inters (the Twin Raise solution). The plumb line Pegs themselves are fixed from existing Pegs on the lower Inter. The three Pegs on the upper Inter can either be in a straight line, or can form the apices of a triangle. When using this option, the following procedure should be followed :-
  - On the new Inter set two new Pegs such that their plumb lines can be lowered down through the Raise, to be visible from the lower Inter, containing the existing Pegs. These plumb line Pegs should be set as far apart as possible, to provide the best orientation accuracy. Place two buttons on each of these plumb lines to be visible from the new Inter.

- Establish a new Peg to be used as the first **Set-Up Peg** on the new Inter. Set-up under this Peg and use the **Double Back Fix** method (described below) to obtain fixing data for this (new) **Set-Up Peg**. If required, the two plumb lines and the **Set-Up Peg** may be placed in a straight line, but this is not essential. A well conditioned triangle (approximately equilateral) should, mathematically, provide the best result.
- On the lower Inter, change the buttons on the two plumb lines so that they are visible, set-up at the nearest fixed Peg to the two plumb lines, and then observe/measure data for fixing both the plumb lines (and hence their two respective Pegs) by means of the **Double Button** method.
- When calculating, first use the **Double Button** programme to calculate the two plumb line Pegs from the set-up at the fixed Peg on the lower Inter. Then use this **Double Back Fix** programme (described below) to calculate the new **Set-Up Peg** on the upper Inter, and also to determine the orientations from this Peg to the two plumb line Pegs.

The programme provides for full double Arc measurements for both Horizontal and Vertical angles, and for double Buttons and double measurements for each sighted Peg. Users can either use these full observation and measurement options, or restrict the survey to a single Horizontal and Vertical Arc, the use of single Buttons and single Distance measurements to the sighted Pegs.

The principle of the programme is relatively simple. It is based on the determination of Directions (or Bearings) plus a base distance comparison, using the "two sides and the included angle" technique for any three Pegs representing the apices of a triangle. The programme is also able to handle the situation where the three Pegs are in a straight line.

The **Height [Z]** of the calculated **Set-Up Peg** is determined by Trigonometrical Heighting, using observations taken to buttons (or bobs) suspended from the two sighted Pegs. For the best results, the double buttons should be observed at each sighted Peg.

NB : It should be pointed out that any Peg determination, whether using this method or the Double Button method, suffers from an inherent weakness in that the calculated Peg Height is totally dependent on a correct Height of Instrument measurement. Pegs whose heights are fixed using any Double Button method alone, should always be verified before their heights can be considered as correct.

The required method of Survey is a **Set-up** at the **Peg** to be fixed, or checked.

At this **Set-Up Peg**, the following quantities should be measured and/or observed :-

- **Face Left** and **Face Right Vertical Angles** to the **Top** and **Bottom Buttons** at both **Back Pegs**.
- Up to two full **Arcs** (**Face Left** and **Face Right**) **Horizontal Angles** to both **Back Pegs**.
- The **Slope Distances** to both **Back Pegs**, measured from the Height of Collimation of the Instrument to the **Top** and **Bottom Buttons** at each **Back Peg**.
- The **Height of Instrument** (Collimation). If this value is measured from a Roof Peg, then the value must be entered as negative.
- The **Height of the two Buttons** at both the **Back Pegs**. If these values are measured from a Roof Peg, then the values must be entered as positive.

The programme allows for both manual entry of field book observations, or automatic loading of the data from a **General Observation File**, without any prior reductions or abstracting of the observations. An example of an Observation File used for this programme (as well as the Double Button method programme) is the file called "**Twin Raise Examples.wob"** (file included).

The entry of the data may also be loaded from a pre-determined **ASCII** file (of type ***.pg3**) containing the information in a set format. Viewing the file **C1984.pg3** (file included) shows the format of a **PG3** type **ASCII** file.

Printing the results is an option available after the required data entries have been made and checked, and the **Set-Up Peg** calculated.

(NB : After installing the **SURPAC** Upgrade, the above included data files will be in the "**C:\Surpac98**" folder (or the folder in which **SURPAC** is installed). If you want to use these examples, first copy these files into the required data folder.)

3. Co-ordinate File Printing – Cadastral Format

When printing a **Co-ordinate File**, a new **Show Categories** option has been provided for files in the **Cadastral** Format.

The available categories are :-

- **Trig. Beacons and TSMs**
- **Working Stations**
- **Beacons Adopted**
- **Beacons not Adopted**
- **Beacons Found**
- **Beacons Placed**
- **Calculated Points**
- **Reference Marks**

If **Show Categories** is set to "**No**", then the listing will be shown as a continuous listing, regardless of any Beacon categories.
If **Show Categories** is set to "**Yes**", then the listing will be separated into the categories for which Beacons exist in the current **Co-ordinate File**.

If **Show Categories** is set to "**Select**", then the listing will be separated into the User selected categories for which Beacons exist in the current Co-ordinate File.

The default option for **Cadastral** format is to partition the listing into the various Beacon and Station categories.

For **Engineering** format files, **Show Categories** is set to "**No**", and may not be User modified.

4. Modifying the SURPAC Security File location

NB : This facility should only be employed if essentially required by a Network security setting.

When running **SURPAC** from a Work Station, or a Terminal, which is a part of a **Windows NT**, or **Windows 2000** Local Area Network, the default location of the **SURPAC** security files can be problematical if the system Administrator has blocked "read/write access" to certain network folders. Theses folders would generally be the "**C:\WinNT**" folders, containing the **Windows** installation files etc. Since **SURPAC** uses these folders as default locations for its security files, the lack of "read/write access" available to **SURPAC** would cause the application to terminate.

If you are experiencing this type of problem, then carry out the following steps (which will only work using **SURPAC Version 5.06**, **Release 03**, or higher) :-

- Copy the files "**Sec.ure**", "**Sec.usr**" and "**Surpac5.ini**" from the "**C:\WinNT**" folder to the folder in which **SURPAC** has been installed (normally "**C:\Surpac98**").
- Do not delete these files from their original "**C:\WinNT**" location, as this will cause **SURPAC** to terminate.
- "Read access" to the "**C:\WinNT**" folder must be maintained, but the "Write access" is no longer required.
- Use any word processor to load and display the file called "**SurpacIniFolder.txt**", found in the folder in which **SURPAC** has been installed (normally "**C:\Surpac98**").
- Change the contents of this file from "**C:\WinNT**" (or "**C:\Windows**") to read "**C:\Surpac98**" (or the name of the folder in which **SURPAC** is installed), and safe the changed file.
- The next time **SURPAC** is run, it will read/write to the security files stored in the defined folder (e.g. "**C:\Surpac98**") instead of the "**C:\WinNT**" folder, thus preventing any clash with the network Administrator security settings.

5. Diagram CAD Programme (Botswana only)

The display order for information in the bottom, right hand information "box" has been changed. Note that the **Lease Diagram (ITO the Tribal Land Act)** option must be set as "**Yes**", for the **L. I. R. No**. to be displayed.

Modifications made to SURPAC Version 5.10, Release 01

1. Modifications for the *Microsoft* Windows XP Operating System

Modifications have been made to **SURPAC** in order to make it fully compatible with the new ***Microsoft*** **Windows XP** Operating System. These modifications do not alter **SURPAC**'s prior compatibility with the ***Microsoft*** **Windows 98**, **NT** and **2000** Operating systems.

Whilst many of these modifications are purely cosmetic in nature, there are some important changes, due to inherent differences between the **Windows 98** and the **Windows XP** Operating systems. From a **SURPAC** point of view, the important advantages of using **Windows XP** are :-

1) An improvement in the operating speed.
2) Better handling of **RAM** for both the PC motherboard and the Graphic Card.
3) The "**out of resources**" problem has been removed. This old bug bear of Windows 95 and Windows 98 has, thankfully, disappeared in **Windows XP** (mainly since **Windows XP** is a derivative of the Windows NT Operating System, rather than Windows 98.)
4) **Windows XP** appears to be a more "stable" (and polite!) platform that the old Windows 95/98 versions, and the need to re-boot the PC due to an application crash, for example, has virtually disappeared.

As a result, **SURPAC** Users running **Windows XP** will find enhanced performance and features, especially in the **SURPAC** graphic applications. For example, when running **Windows XP**, it is possible to generate a graphic image (to be stored in a file or copied to the **Windows** Clipboard), which may be up to twice the width and height of an A0 sheet. This can be carried out, for example on a PC having 256Mb on board RAM, plus a graphic card with 64Mb RAM.

Suggested setting for the Screen Display parameters of Windows XP for SURPAC

1) Do a Right Button Click when the cursor is anywhere on the **Desktop** display. On the displayed menu, click the "**Properties**" item. This will bring up the Windows "**Display Properties**" form.
2) On this form, click the [**Settings]** Tag.
3) Set the "**Color quality**" option to **Medium (16 bit)**.
4) If you have a screen that is 15", or more, in diagonal measurement, set the "**Screen resolution**" to **1024** by **768** pixels.
5) Click the "**Appearance**" Tag.
6) Leave the "**Windows and buttons**" as "**Windows XP style**", the "**Color Scheme**" as "**Default (blue)**" and the "**Font size**" as "**Normal**".
7) Click the [**Advanced**] Button
8) From the "**Item**" list, select "**Active Title Bar**" and set its size to "**20**".
9) From the "**Item**" list, select "**Menu**" and set its size to "**18**". Set its "**Color 1**" to the standard form colour (beige). Set its "**Font**" to "**Arial**", "**Font Size**" to **10**, "**Font Color**" as "**Black**" and set the "**Bold**" option to "**on**" (i.e. the "**Bold**" option should be highlighted.)
10) From the "**Item**" list, select "**Message Box**" and set its "**Font**" to "**Arial**", "**Font Size**" to **10**, "**Font Color**" as "**Black**" and the "**Bold**" option to "**on**". (i.e. the "**Bold**" option should be highlighted.)

The above settings provide colour and menu settings that provide easy and comfortable displays when running the various **SURPAC** applications.

2. Digital Terrain Modelling – Programme extensions

Improved display functions are now available for :-

1) **Cut** and **Fill** Volumes from a given horizontal plane,
2) Location of the horizontal **Cut** and **Fill** Volume balance plane , and
3) **Cut** and **Fill** Volumes between two separate, Surface **DTMs**.

These displays now show a 2D, colour display of the resultant Cut and Fill Volumes. This "dispersal" plan shows areas of Cut and Fill, using a colour gradient from **bright Red** (for areas of large Cut) through **Red** – **Orange** – **Green** to **bright Green** (for areas of large Fill).

Moving the cursor around the display provides the ground [**Y**, **X**, **Z**] (or [**E**, **N**, **H**]) co-ordinates for the cursor position, plus the position's Cut, or Fill, Volume per grid square. The dimensions of the grid square are the same as the Grid Interval chosen by the User, when the **DTM** was created. The colour "dispersal" displays may be printed to a Plotter/Printer device, at any suitable scale.

When using the **Solid Model Display** option of a **Surface** or **Base DTM**, a new colour option has been added. These is referred to as the **Multi Colour** option.

Using this **Multi Colour** option, the **DTM** display (or Print out) will use the three basic colours **Red Green** and **Blue** to show **DTM** height differentiation, instead of the single colour used with the other solid model colour options.

3. The General CAD Plotting and the General Plan CAD Programmes – Active Pen

Both of these applications now provide the "**Active Pen**" option.

This option works as a "**Layering**" function, allowing the User to switch on, or off, the display of information allocated to a given Pen.

The programmes have available **8 Pen** options (**Pen1** to **Pen8**) for standard Line, Arc, Circle and Text item display. By default, these **Pens** are represented as the colours **Black**, **Red**, **Blue**, **Green**, **Cyan**, **Brown**, **Purple** and **Grey** respectively. Apart from one of these colours, an individual line may have a Line Thickness and/or a Line Style attributed to it.

The new "**Set Active Pen**" function (found under the **Draw** menu for the **General CAD Plotting** programme, and under the **Line** menu for the **General Plan** programme) allows the User to select which of the 8 standard Pens (or Layers) are to be visible, for both screen displays and Plotter outputs. Theses values may be redefined at any future time.

One useful application of this function in the **General CAD Plotting** programme is to suppress the display of Pen8, once its use as a "**BackGround**" Layer has been completed. (See below)

Using Pen 8 (Grey) as a BackGround Layer (General CAD Plotting Programme only)
All data drawn with **Pen 8** (**Colour Grey**), or that have been imported into **Pen 8**, may be set as being "**BackGround**" data. These data are visible (in grey) but are not treated as being "active". They provide a visible background of information that can act as a reference and/or comparison to the actual (non-Grey) information being constructed, or edited.

NB : Graphic Images may also be scaled and positioned so as to provide a true background of information. Orthophoto images supplied free of charge by the **Chief Directorate: Surveys and Mapping**, **Mowbray** are very useful for this purpose.

When importing data from a **DXF** file, or from another **SURPAC** Sheet (e.g. **General Plan**, **Working Plan** etc.) the options now exist to import these data directly into **Pen 8** (**Grey**). Setting the "**BackGround**" option as **ON** will set all these data as being **BackGround** only.

Selecting/Deselecting the **BackGround** option is done by either pressing the **[F11]** Key, or by clicking the appropriate menu item found under the Programme's **General** main menu heading.

When the **BackGround** option is **ON**, all **Lines**, **Arcs**, **Circles** and **Text Items** that are drawn using **Pen 8** (**Grey**) will remain visible, but be non-active. The only functions, or Commands that will remain active for **Pen 8** data will be the **[LD] – Line Dimension** and **[LIC] – Line Parallel Check** Commands. The **BackGround** option can be toggled **ON/OFF** by pressing the **[F11]** key.

This function can be very useful, for example, when information is to be imported from a **DXF** file, and when a mathematically correct layout is to be constructed, based on the imported **DXF** information. In this case, when importing the data, set all **DXF** Layers to be imported into **Pen 8** (there is an Option on the **DXF** Import form that will automatically do this, if required). After the importing is complete, select the "**BackGround**" option as **ON** by pressing the **[F11]** key.

For data that already exist on a **General CAD Plotting Sheet**, use the **Reset Line Attributes** and **Reset Text Attributes** Commands to change required data to **Pen 8** (for speed, use the global "**Change All Lines of this type**" when resetting Lines).

4. The General CAD Plotting Programme – Importing Graphic Images

This function has been improved so as to ensure that an **Image** is imported at the correct scale relative to the Sheet onto which it is being imported. This requirement is important, for example, when importing **Orthophoto** images, (such as those supplied by the **Chief Directorate: Surveys and Mapping**, **Mowbray**). As these type of images have no defining grid lines, or marks, it is essential that the top, left corner of the image (for which co-ordinates are provided) is correctly positioned, and that the image imported at the correct scale.

When selecting an image file for importing, the selection form now includes the option :-
"**Import the Image applying the Scale Factor of :** ". The default value is 1. However, if you are importing a 1:10,000 Orthophoto image, for example, onto a CAD Plotting Sheet whose defined Plotting scale is 1:20,000, then this Scale Factor should be changed to 0.5.

Whilst the **Orthophoto** images supplied by the **Chief Directorate: Surveys and Mapping** are very useful to Surveyors as background data, they do arrive in the **TIFF** format. **SURPAC**, however, imports files in the **Bitmap**, **JPEG**(**JPG**), **ICO**, **WMF** or **EMF** formats. Furthermore, the **TIFF** format is not as compressed as the **JPEG** format. Users are advised to use any graphics application to convert these **TIFF** files into **JPEG** files, before attempting to import them into **SURPAC**. Using the converted **JPEG** format (which compresses the **TIFF** files by a factor of about 7) allows screen displays of the 1:10,000 images to a scale of 1:2,500, without any visual loss of definition.
Orthophoto **images, (such as those supplied by the** Chief Directorate: Surveys and Mapping**,** Mowbray

5. All SURPAC CAD Programmes – Export Sheet to a Bitmap Image

All **CAD** Programmes now have the item "**Output to a Bitmap Image File**" included in the "**File**" main menu heading.

Although this item is functional for all the **Windows** operating systems, its optimal functionality is only available when using the **Windows XP** Operating System.

This output function is very useful when a **CAD** Sheet (a **G**.**P**., a general **Plot** Sheet, **Diagram**, **Contour Plot** etc.) is required by a client, or another application, in a graphic file mode rather than as a **DXF** file, or **HPGL** file.

When selecting this menu item, you will have up to 5 options for selecting the image to be created :-

1) (**Windows XP only**) This allows for the creation of a **Bitmap** file of the entire sheet (up to **A0** in size), plotted at the User defined **Plot Scale**. The resulting **Bitmap** image will, therefore, be the same size as the User defined Sheet size.

2) (**Windows XP only**) This allows for the creation of a **Bitmap** file of the entire sheet (up to **A0** in size), plotted at **twice** the User defined **Plot Scale**. (i.e. if the defined **Plot Scale** is **1:1000**, then a bitmap image will be created at a scale of **1:500**). The resulting **Bitmap** image will, therefore, be twice as wide and twice as high as the User defined Sheet size.

3) For **non- Windows XP** Operating systems, the User may select the **Extended Screen View** option. This will generate a **Bitmap** image, at the current screen scale, covering the panning limits currently available.

4) The User may select the **Current Screen View** option. This will generate a **Bitmap** image of the Sheet, at the current screen scale, covering the currently visible screen area.

5) The User may select the **Screen View** by using the Mouse **LHB** and Mouse **RHB** to define the required area. This will generate a **Bitmap** image of the Sheet, at the current screen scale, covering this screen area.

Users also have the option of storing the generated **Bitmap** image to a permanent disk **File**, or to the **Windows Clipboard**.

Notes :

The PC's Desktop "**Color quality**" option must be set to **Medium (16 bit)**, and not the High (24 bit), or (32 bit) options.

SURPAC will only create files in the **Bitmap** format. This format produces high quality graphic images, but also requires relatively large storage space, as it is not a compressed format. Before sending an image by e-mail, for example, Users are advised to use a graphics application to convert the created **Bitmap** image **(***.bmp**) into a compressed **JPEG (***.jpg**), or **GIF (***.gif**) format. There are numerous applications that are able to do this, including the **Paint** application which is included on your PC as a part of the **Windows** installation.

The above creation of the large (up to twice **A0** in width and height) Bitmap images when running Windows XP were be carried out on a PC having **256Mb** on board **RAM**, plus a **graphic card** with **64Mb RAM**. A PC with less available mother board and/or graphic card memory might not be able to generate double A0 graphic images.

Apart from the above described modifications, various other changes have been made to the software. These mainly consist of fix ups for small problems and "bugs" that have been reported during the past 3-4 months.

SURPAC Programmes Modifications for Version 5.10, Release 03

New SURPAC Modular Structure

SURPAC has now been sub-divided into further Modules, in order to make the software more flexible. Existing Users will notice the following Modular Structure displayed when **SURPAC** start up, or when the "**User Information**" menu item is selected :-

Installed SURPAC Software Modules

SURPAC "Lite"
SURPAC Conversions
SURPAC Least Squares
SURPAC Topographical
SURPAC Engineering
SURPAC Mining
SURPAC Cadastral (Standard)
SURPAC Cadastral (Extended)

NOTE : The **SURPAC Topographical Module** that existed before **June 2003** is now the equivalent of the combined, new Modules called **SURPAC "Lite"**, **SURPAC Conversions**, **SURPAC Least Squares** and **SURPAC Topographical**.

Users should not notice any change in accessibility to applications for which a License has previously been acquired.

The minimum, entrance level, for **SURPAC** Software is now the **SURPAC** "**Lite**" Module. If you would like to see which applications make up the **SURPAC** "**Lite**" Module, please visit our Internet site **www.surpac.co.za** .

Shaded Background Options

The **Contour Creation/Plotting CAD**, the **Digital Terrain Modelling** and the **General CAD** programmes have all had an enhanced **Background Shading** option added.

This type of **Background Shading** is based on the **DTM** data generated for a User defined **Tacheometric File**. A smooth colour graduation of a User selected base colour is displayed, ranging from very Dark to very Light. The total height graduation is based on the total height difference of the **DTM**, and an individual cell colour graduation is based on that cell's height value. The colour graduation can be set to range from Dark to Light going from Lowest Height to Highest Height, or from Dark to Light going from Highest Height to Lowest Height.

This function can be used to highlight topographical features in a 2D display for both the **Contour Creation/Plotting CAD** and the **General CAD** programmes. This can be used to enhance the Contour display, or to show the topographical relief as a background layer for a drawing, such as a township layout.

The smaller the grid used for determining the **DTM**, the better is the colour graduation for the Background Display.

Reading and Running Peg ASCII Files (Mining)

As Users of the **SURPAC** Mining Peg fixing programmes will know that, when fixing, or re-fixing an underground Peg, an option for creating a **Peg ASCII** file (containing both the entered and calculated information for the fix) is offered. These **Peg ASCII** files may then be used at any future time to recall the entered information into the appropriate Peg Fix programme, and to re-calculate the Peg values.

By default, the name given to a **Peg ASCII** files consists of the **Peg Name**, followed by the **date of calculation**, plus the **file extension**.

Peg ASCII files generated through the **Double Set Up** Programme use the file extension **.PG1**, files generated through the **Double Button** programme use the file extension **.PG2** and files generated via the **Double Back Fix** programme use **.PG3**.

For example, the file called "**A3925[07-31-02].PG2**" would contain the **ASCII** data for the peg Fix of Peg **A3925**, calculated on **31-07-02**, using the **Double Button** programme.

To improve the functionality of these **Peg ASCII** files, **SURPAC** now supports 2 new methods in which these **Peg ASCII** files may be called and viewed, plus the option to automatically re-calculate the Peg concerned.

Method 1 Click the "**Mining**" heading in the Main menu and from the displayed menu, select the "**View the Existing Peg ASCII Files**" item.

A display of all existing **Peg ASCII** files, in the current data folder, will be displayed. From this display you can select the required file for viewing by double clicking it.

The file's data will then be displayed in a scrolling list form. Options on this form allow you to either change to another **Peg ASCII** file, send the displayed information to the Windows **Clipboard**, **Exit** form the display, or **Re-Calculate** the Peg fix.

If the last option is selected, the **Peg ASCII** data will automatically be sent to the appropriate Peg fix programme. If the **Peg ASCII** file selected does not relate to the current **Co-ordinate File**, you will be warned and the calculation will abort.

Method 2 When the **Co-ordinate File Editing** programme is running, click the mouse Right Button anywhere on the line displaying the Point for which a list of **Peg ASCII** files is required. A Pop-Up menu will be displayed. One of the items on this menu will be the "**View ASCII Peg Files**" item. (If the selected Point, or Peg, does not have any **Peg ASCII** files associated with it, then this menu item will be non-active.)

A display of the existing **Peg ASCII** files for the selected Point (Peg) will be displayed. From this display you can select the required file for viewing by double clicking it.

The file's data will then be displayed in a scrolling list form. Options on this form allow you to either change to another **Peg ASCII** file, send the displayed information to the Windows **Clipboard**, **Exit** form the display, or **Re-Calculate** the Peg fix.

If the last option is selected, the **Peg ASCII** data will automatically be sent to the appropriate Peg fix programme to allow for a possible recalculation.

Other Changes Made

Apart from the above described modifications, various other changes have been made to the software. These are :-

1) Longitudinal Section and **Cross Section** programmes : The **Plotter/Printer** device was not being selected correctly by these programmes. This was especially apparent when trying to plot to a network device. This problem has now been corrected. The positioning of the plots has also been modified to make sufficient allowance for the Plotter/Printer margins.

2) When running **Windows XP**, an option has been included to restrict the maximum size of graphic displays in the CAD programmes to the same size as that used by Windows 98. This is to allow for those Users who might be running **Windows XP**, but on a PC having a graphics card with only 8Mb, or 16Mb RAM.

Ideally a PC, or Laptop, running **Windows XP** needs a RAM of 256Mb plus a graphic card with an on-board 64Mb RAM. A PC such as this is comfortably capable of handling the extended graphics used in **SURPAC**. This option can be found by clicking the **[Options]** button in the **Co-ordinate File Editing** programme.

3) Transformations to/from "Lo" Cape Datum to WGS 84 (Hartebeesthoek94 Datum)

Users can now **select Points** from a **Source Co-ordinate file**, instead of having to transform the entire file. When selecting the "Source Data Entry Mode", Users will notice that the Source data can be either "**Co-ordinate File-All Pnts**" or "**Co-ordinate File-Selected**" (apart from the three other options for Manual Data, ASCII Co-ordinate Data and ASCII [Lat, Long] Data).

If the latter of the above two Co-ordinate File Sources is chosen then, after the **[Compute File]** button has been clicked, a form will be displayed through which Users will be able to mark (click) the Points required for the transformation. The selected Points can either be individually marked, or a Block of Points can be defined by giving the first and last Points for the required Block.

SURPAC Programmes Modifications for Version 5.20, Release 01

General Topics

User Feedback

This latest **SURPAC** Upgrade contains some important modifications and extensions, as listed below. Apart form these programme modifications, various small "bugs" that have been reported in the course of the past 3 months have been fixed.

Please ensure that you upgrade you **SURPAC** Software with this latest release. Whilst I welcome feedback (both positive and negative) from Users, please note that only problems, or "bugs" reported by Users running the latest release of **SURPAC** can be addressed. In the past, we have had various Users calling to report software problems, only to find that they are actually running an out of data version of **SURPAC**, and that the reported problems had been fixed some time previously!

I know that some Users like to keep their existing **SURPAC** version running and let other Users discover and report any problems that might be present in a new release. Obviously, as a **SURPAC** User you are at liberty to use this approach, but bear in mind that problems reported by User running older releases of **SURPAC** will not be attended to, unless these problems are found to be present in the latest software release.

Storing the "Actbar2.ocx" file

When implementing this **SURPAC** Software Upgrade, the latest version of the library file called **Actbar2.ocx** will automatically be located in the "**C:\Surpac98**" folder (or the folder in which you have installed **SURPAC**).

To ensure the best performance of the new "**Actions**" **Bar Menus**, **Copy** this file into :-

- the "**C:\Windows\System**" folder (for **Windows 95** and **Windows 98**),
- the "**C:\Windows\System32**" folder (for **Windows XP**),
- the "**C:\WinNT\System32**" folder (for **Windows NT** and **Windows 2000**).

New : SURPAC "Actions" Bar Menus

The majority of the **SURPAC** programmes have, until now, used a left hand side display of Buttons indicating the various programme options and/or functions.

These Buttons have now been replaced by "**Actions" Bar Menus**. Each menu item in an "**Actions" Bar Menu** uses both Text and Graphic entities to identify the action that will be carried out by selecting that menu item. As the cursor is run down, or across, an "**Actions" Bar Menu**, the menu item currently under the cursor is highlighted.

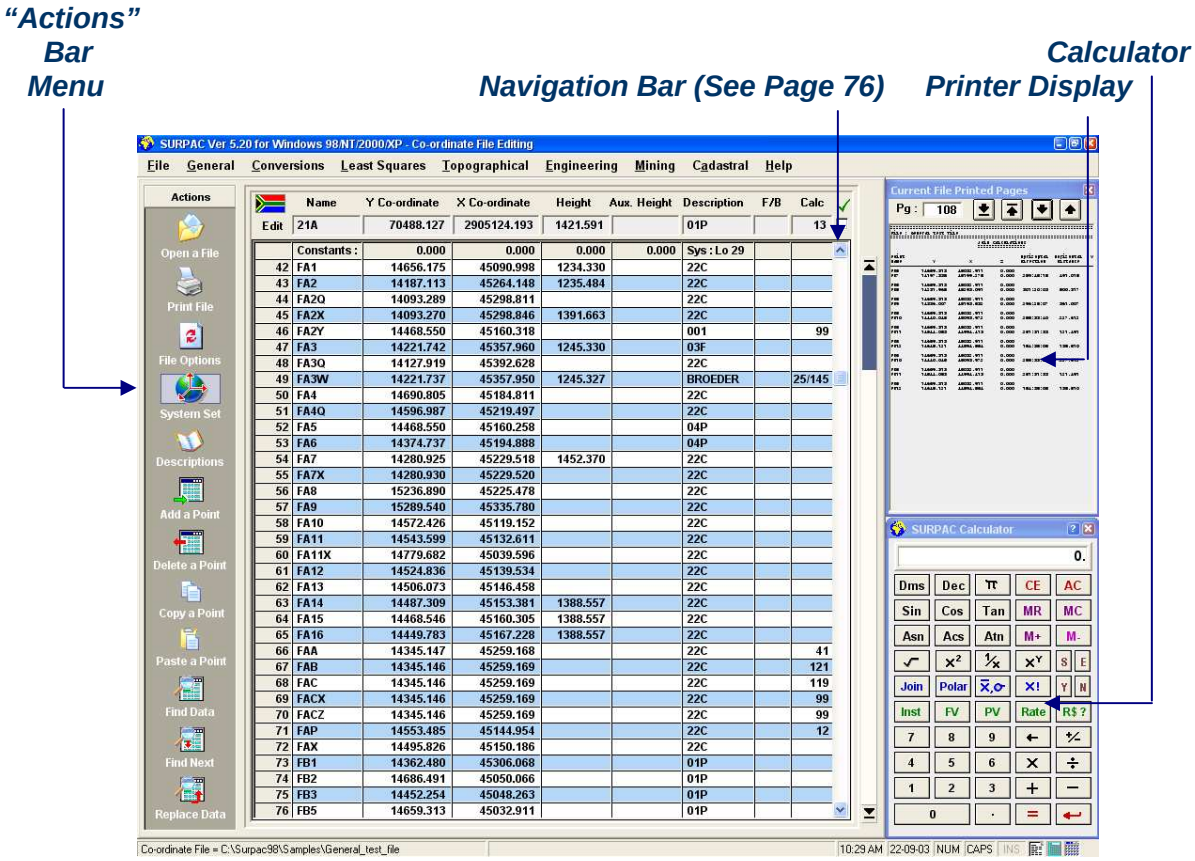
The inclusion of the graphic entities in the "**Actions" Bar Menu** makes their use more intuitive and obvious than the previously used Buttons. To select a menu item on an "**Actions" Bar Menu**, move the cursor onto the item required and then click the item (single click of the Mouse LHB).

Please note that the use of these **"Actions" Bar Menus** has been optimized for a **Screen Display Area** of **1024X768** pixels. This is the optimal resolution for running **SURPAC** Software.

If you are still running **SURPAC** using a **Screen Display Area** of 800X600 pixels, then use the **Windows** "**Control Panel**" to reset this to a display of 1024X768 pixels. At the same time, check that the "**Color**" setting is set to **16 Bit Color** (do not use 24 Bit or 32 Bit, as these colour levels use up large amounts of graphic memory and will limit scaling of Sheets in the **SURPAC CAD** programmes).

If you do decide to leave the **Screen Display Area** set as 800X600, you will find that some of the "**Actions" Bar Menus** are too large to completely fit on the screen, resulting in the necessity to use "**Up**" and "**Down**" arrows to navigate through the Menu. With the exception of the "**General Observation Load/Edit**" programme, these "**Up**" and "**Down**" arrows only appear if the Menu is too large for the Screen. The arrows will appear on the right hand side of the Menu bar, and clicking on them moves the Menu display in the appropriate direction.

Below is a **SURPAC** programme display, showing the on-screen information layout when using a 1024X768 pixel resolution in **Windows XP**.



	Constants :	0.000	0.000	0.000	0.000	Sys : Lo 29		
42	FA1	14656.175	45090.998	1234.330		22C		
43	FA2	14187.113	45264.148	1235.484		22C		
44	FA2Q	14093.289	45298.811			22C		
45	FA2X	14093.270	45298.846	1391.663		22C		
46	FA2Y	14468.550	45160.318			001		99
47	FA3	14221.742	45357.960	1245.330		03F		
48	FA3Q	14127.919	45392.628			22C		
49	FA3W	14221.737	45357.950	1245.327		BROEDER		25/145
50	FA4	14690.805	45184.811			22C		
51	FA4Q	14596.987	45219.497			22C		
52	FA5	14468.550	45160.258			04P		
53	FA6	14374.737	45194.888			04P		
54	FA7	14280.925	45229.518	1452.370		22C		
55	FA7X	14280.930	45229.520			22C		
56	FA8	15236.890	45225.478			22C		
57	FA9	15289.540	45335.780			22C		
58	FA10	14572.426	45119.152			22C		
59	FA11	14543.599	45132.611			22C		
60	FA11X	14779.682	45039.596			22C		
61	FA12	14524.836	45139.534			22C		
62	FA13	14506.073	45146.458			22C		
63	FA14	14487.309	45153.381	1388.557		22C		
64	FA15	14468.546	45160.305	1388.557		22C		
65	FA16	14449.783	45167.228	1388.557		22C		
66	FAA	14345.147	45259.168			22C		41
67	FAB	14345.146	45259.169			22C		121
68	FAC	14345.146	45259.169			22C		119
69	FACX	14345.146	45259.169			22C		99
70	FACZ	14345.146	45259.169			22C		99
71	FAP	14553.485	45144.954			22C		12
72	FAX	14495.826	45150.186			22C		
73	FB1	14362.480	45306.068			01P		
74	FB2	14686.491	45050.066			01P		
75	FB3	14452.254	45048.263			01P		
76	FB5	14659.313	45032.911			01P		

SURPAC application display using an "Actions" Bar Menu and a Navigation Bar (Screen Display at the recommended 1024x768 pixel resolution)

New : Navigation Bars for File Display Programmes

The major **SURPAC** programmes that show **File Lists** now include a **Navigation Bar**. These programmes include :-

- **The Co-ordinate File Editing programme,**
- **The Observation File Loading/Editing programme,**
- **The Level Observation File Loading/Editing programme,**
- **All the Geographical from/to [Y, X] (or [E, N] Transformation programmes,**
- **The Standard Helmert and Polynomial Transformation programmes,**
- **All the Goldfield from/to Lo System Transformation programmes,**
- **The Least Squares Planimetric Adjustment programme,**
- **The Least Squares Trig. Levelling Adjustment programme,**
- **The Least Squares Spirit Levelling Adjustment programme.**
-

The purpose of a **Navigation Bar** is to allow for a more rapid and flexible movement through a list of data and is especially useful for large File Listings. The normal file listing Scroll Bars are still used to allow scrolling through the lists, as before.

Features of a **Navigation Bar** are :-

- As you select a Point, or Line, in a File Listing, the **Navigation Bar** will display a highlight Bar (normally dark blue) which indicates how far that Point, or Line, is from the head of the File Listing.
- By clicking the arrow at the **Top** of the **Navigation bar** the File Listing will be set to display the **First** Point/Line of the Listing.
- By clicking the arrow at the **Bottom** of the **Navigation bar** the File Listing will be set to display the **Last** Point/Line of the Listing.
- If the mouse cursor is placed anywhere in the **Navigation Bar**, a pop-up text display will show the **Name** of the Point that would be shown and highlighted in the File Listing, if the mouse button were to be clicked at that position.
- Once a Point **Name** is displayed, running the cursor up or down the **Navigation Bar** will show successful Point **Names** in the pop-up text display.
- Clicking anywhere in the **Navigation Bar** will cause the File Listing to change its position so as the show and highlight the Point/Line relative to the position clicked.

New : “Undo” Buttons for SURPAC CAD Programmes

All **SURPAC CAD** programmes now include two “**Undo**” functions (aka “Blond buttons”).

Undo Previous Task

The first of these two functions allows the User to backtrack (or **Undo**) up to **9 Drawing Tasks** carried out in the current programme session. A **Drawing Task** is any screen activity that modifies data on the current drawing, e.g. **Lines**, **Arcs**, **Circles**, **Text Items**, **Hatching**, **Contours**, **Graphic Items** etc. Activities such as changing Scale, Orientation etc. are not considered as drawing tasks, as these may be changed at any time by the User.

To **Undo** a **Drawing Task**, either :-

1. From the **CAD** programme's "**Edit**" Menu Heading, select the item called "**Undo Previous Task**", or
2. Use the keyboard **Ctrl+Z** function (i.e. press and hold down the **Ctrl** key and, at the same time, press the **Z** key.)

Once a maximum of 9 "**Undo**" operations have been done, the "**Undo Previous Task**" menu item will be "greyed out" (made non-active), indicating that no more **Undo** tasks can be undertaken. This menu item will become re-activated when you perform further **Drawing Tasks**.

Undo All Session Tasks

The second of the two **Undo** functions allows the User to **Undo All Drawing Tasks** carried out during the current session. The drawing will revert to the state it was in when it was loaded a the start of the session. Use this feature with caution!!

To **Undo All Session Drawing Tasks**, either :-

1. From the **CAD** programme's "**Edit**" Menu Heading, select the item called "**Undo All Session Tasks**", or
2. Use the keyboard **Ctrl+Q** function (i.e. press and hold down the **Ctrl** key and, at the same time, press the **Q** key.)

The time taken for **SURPAC** to perform an **Undo** action depends on both the speed of the computer used and the complexity of the drawing involved. For an average General Plan, CAD drawing etc., and when using a Pentium IV 2.0 Gh based PC, the time taken is negligible, being a few hundreds of a second. Complex drawings that include Graphic images and large amounts of Text, running on a Pentium II 400Mh based PC for example, could take a few seconds.

New : Temporary Deletion of Co-ordinate File Points

Temporary Deletion of Co-ordinate File Points

Now, when **Co-ordinate File Points** are **Deleted** (using any of the available Delete options), they are only **Temporarily Deleted**. They are maintained in the **Co-ordinate File** and marked as being **non-Active**. Such **non-Active** Points will not be used, or recognized, by any of the **SURPAC** programmes whilst they are in this state.

Restoring Temporarily Deleted Points

These Points can, however, be recalled and again made **Active** at any time (unless they have been **Permanently Deleted** - see below). To make **Temporarily Deleted** Points **Active**, go to the **Co-ordinate File Editing** programme and click the "**File Options**" item in the "**Actions" Bar Menu**.

On the displayed form is a frame entitled "**Co-ordinate File Edit options**". If **Temporarily Deleted** Points exist for the current **Co-ordinate File**, then the option "**Restore Deleted Points in the Co-ordinate File**" in this frame will be active.

Click on this option and then click the **[OK]** Button. A new form will list all the **Temporarily Deleted** Points in the file. Mark (tick) the Points that are to restored and click the **[OK]** Button. The selected Point(s) will again become **Active**, and will be available for use by all **SURPAC** programmes.

Permanent Deletion of Co-ordinate File Points

If you want to **Permanently Delete** Points that are currently defined as **non-Active** (i.e. have been **Temporarily Deleted**) then go to the **Co-ordinate File Editing** programme and click the "**File Options**" item in the "**Actions" Bar Menu**.

On the displayed form is a frame entitled "**Co-ordinate File Edit options**". From this frame select the option "**Purge the current Co-ordinate File**" and then click the **[OK]** Button. If **Temporarily Deleted** Points exist, you will given the choice of **Permanently Deleting** these Points during the **Purge** action.

New : Peg Index using the Peg ASCII Files (Mining)

The use and flexibility of the **SURPAC Peg ASCII Files** has again been extended by the addition of a **Peg Index** programme which uses data taken from these **Peg ASCII Files**, as opposed to the **Co-ordinate File**.

Users of the three **Mining Peg Fixing** programmes will know that, when fixing, or re-fixing an underground Peg, an option for creating a **Peg ASCII File** (containing both the entered and calculated information for the fix) is offered. These **Peg ASCII Files** may then be used at any future time to recall the entered information into the appropriate **Peg Fixing** programme.

By default, the name given to a **Peg ASCII File** consists of the **Peg Name**, followed by the **date of calculation**, plus the **file extension**.

For example, the file called "**A3925[07-31-02].PG2**" would contain the **ASCII** data for the **Peg Fix** of Peg **A3925**, calculated on **31-07-02**, using the **Double Button** programme.

Programme Description

This new programme provides a listing of the **Peg Index** information derived from information held in the **SURPAC ASCII Peg Files** that exist in the current Data Folder (i.e. the Folder containing the currently loaded **Co-ordinate File**).

Data relative to both the **Peg** fixed in the **SURPAC Peg ASCII File** and the **Back Peg** used for the Fix are displayed in this **Peg Index**.

In the case of **multiple** Fixes of the same **Peg**, all Fixes will be shown in the **Peg Index**. This differs from the **Printing a Co-ordinate File** programme which will only show the latest calculated (and stored) values of a **Peg**. Furthermore, the **Printing a Co-ordinate File** programme is unable to display many of the display items shown by the new **Peg Index** programme since these items are not a part of a standard **Co-ordinate File**.

The programme allows for either the display of all **Peg ASCII File** information, or the display can be limited to those **Pegs** that are common to the current **Co-ordinate File**.

The displayed data may be copied to the **Windows Clipboard** from which it may be imported (Pasted) into most other applications, such as ***Microsoft*** **Excel** etc.

Once the **Peg Index** is displayed, the full **Peg ASCII File** information for any **Peg Fix** may be displayed by **double clicking** on the line containing the **Peg Fix** required.

Programme Operation

From the **SURPAC** "**Mining"** main Menu heading, select the "**Peg Index Using the Peg ASCII Files**" Menu Item.

The programme will search the current Data folder for the existence of all **Peg ASCII Files** (files with the extension *****.pg1**, *****.pg2** or *****.pg3**). If such files are found, the **Peg Index** information required for each **Peg** will be extracted.

All data will then be displayed in the **Peg Index**, which will be listed in alphanumeric order of the Points Fixed.

You may now Select whether you want to view the Peg **Index** for all existing **Peg ASCII Files**, or just those for which the **Peg** fixed is common to the current **Co-ordinate File**.

Finally, if you want to view this **Peg Index** information data in another application (such as ***Microsoft* Excel**), then click the "**Send the data to the Windows Clipboard**" Button. This Clipboard information may then be Pasted into applications such as ***Microsoft* Excel, *Microsoft* Access** etc.

Modification : Diagram CAD Programme

The following modifications have been made to the **Diagram CAD** programme :-

1. The handling of **Text** items relating to a **Diagram** Figure with an orientation swing has been improved. When a **Diagram** Figure is swung, any Text items inside the Figure Drawing Area (which is defined by dashed grey lines) area also transformed (re-positioned and re-oriented) in sympathy with the Figure. In the past, Text items close to the left side of the Figure Drawing Area were sometimes given a reverse orientation, making them appear in the incorrect position. These has now been corrected. Using the "Frame Copy" function for copying Text items from outside the Figure Drawing Area to inside this area has also been fixed.

2. The "**Insert a Blank Data Block Line**" and "**Delete a Data Block Line**" functions were not working correctly. These has now been corrected.

3. When creating a Diagram from either the **General CAD** programme or the **Working Plan CAD** programme, the number of sides in the Diagram was inadvertently limited to 70. This has been corrected and the new limit has now been set to 300 sides.

4. As for all the other **SURPAC CAD** programmes, the **Diagram CAD** programme now has the two **Undo** functions included in the "**Edit**" menu (refer to Page 2)

Modification : General CAD Programme

The following modifications have been made to the **General CAD** programme :-

1. A **Point Layering System** has been added. This Layering System is based on the Beacon Descriptions used for the current Co-ordinate File. For **Cadastral** Mode Co-ordinate Files there are up to **55 Point Layers**, and for **Engineering** Mode Co-ordinate Files there are up to **300 Point Layers**. (Refer also to Page 10)

   When you start a new General **CAD** drawing sheet, the programme will search through the list of existing Points in the Co-ordinate File and determine which of the Beacon

Descriptions for that file have actually been used. The **Point Layers** corresponding to these used Descriptions will be **Activated** and set as being **Visible**. As you add and, modify or delete Points from the Co-ordinate File, the list of **Active** and **non-Active Point Layers** will be modified accordingly.

To change the **Visibility** of the **Active Layers**, click the programme's "**Point**" menu heading and then select the "**Set the Visible Point Layers**" item. The displayed form will show all the available **Layers** for the Co-ordinate File. All the **non-Active Layers** (Beacon Descriptions not used) will be shown in grey, italic text. The **Active Layers** will be in black, standard text with either a **green** tick (**Layer** is **Visible**), or a **red** cross (**Layer** is **not Visible**) displayed on the right hand side. Click on an **Active Layer** to change its **Visibility** status.

This function has the primary use of making Visible only those **Points** required at a given time. It also makes the allocation of Mark Points to certain Descriptions easier.

Bear in mind that the **Point Layers** have no effect on the other drawing items such as Lines, Arcs, Text Items or Hatching. For **Lines** and **Arcs**, you can use the "**Set Active Pens**" menu item found under the "**Draw**" menu heading, and for **Text Items** you can use the "**Set Active Pens**" menu item found under the "**Text**" menu heading. These functions make their respective items either visible, or non-visible, for the Pen colours selected.

2. The function to **Transform the Sheet Data Items** has been added. This feature provides for a Helmert Transformation based on 2 to 5 common points identified by the User. This facility is useful for re-scaling, re-positioning and re-orientating imported **DXF** drawings, for example. However, it can be used for transforming any existing General **CAD** drawing.

   Before using this function, make sure that you are able to identify between 2 and 5 points common to both the existing drawing (which could just be an imported **DXF** drawing, for example) and to the **True System** (into which the drawing is to be transformed.) Ideally, the **True System** should be the System as used by the current **Co-ordinate File**. To make the transformation easier, add Points to the Co-ordinate File that corresponds to these Final system common points.

   To run this function, click the programme's "**Edit**" menu heading and then select the "**Transform Sheet Data items**" menu item. The displayed form allows for up to 5 common points, the minimum being two. Move the cursor on the drawing and click onto the first common Point. The sheet co-ordinates of this Point will be placed into the first two text boxes on line 1 ("**Sheet Y-value**" and "**Sheet X-value**"). Click the text box labelled "**True Y-value**". If you know the Name of the corresponding True system Point, and this Point is stored in the current Co-ordinate File, then enter this Name. If the Point is found, the "**True Y-value**" and "**True X-value**" text boxes will be filled. If you do not have a stored Point, then manually enter the **True System [Y, X]** values for the Point.

   Continue as above for up to 5 common Points. Keep a watch on the **Transformation** Parameters at the bottom of the form in case of gross errors. The **Transformation** form itself will stay visible over the **CAD** Sheet, even if you change scale or sheet position. After you have entered the last required Point, click the **[Proceed]** Button and the **Transformation** will take place. All drawing items, except the Points themselves, will be transformed based on the common points used. In the event of any incorrect **Transformation**, remember the "**Undo**" function!

3. The **Hatching** facility has been extended, with 3 new **Hatch** options available. These are "**Dotted Background**", "**Broad Stripes**" and "**Narrow Stripes**". All Hatching options can be found by clicking the "**Hatch**" menu heading.

4. As for all the other **SURPAC CAD** programmes, the **General CAD** programme now has the two **Undo** functions included in the "**Edit**" menu (refer to Page 2)

Modification : Using the [Esc] Key to Exit from programmes

It appears that some Users have not as yet managed to fully come to grips with the way **Windows** based programmes work, and some are clinging to the **MS-DOS** style of programme operation. In the past couple of months, I have had two Users who have phoned with the following type of query :-

"*I selected the Geographical - Lo transformation programme. When this programme displayed its Option Setting form, I decided to abort the calculation and wanted to return to the Co-ordinate Editing programme, but the transformation programme had no Exit button so I had to re-boot the PC in order to do this."*
to navigate around applications such as **SURPAC**.

Whilst it is true that not all **SURPAC** programmes have explicit "**Exit**" buttons, getting back to say the Co-ordinate Editing programme is simply a matter of clicking on the "**General**" main menu heading and then selecting the "**Co-ordinate File Editing**" menu item – two clicks of the Mouse!

In spite of the simplicity of programme navigation with a Mouse, I have now set up the **[Esc]** key as a method to enable Users to abort a currently running programme and to back track until the **Co-ordinate File Editing** programme is reached.

This **[Esc]** function works as follows :-

- If you are currently in some programme function, such as viewing the programmes available options, then the **[Esc]** key (i.e. pressing the **[Esc]** key on the keyboard) will take you out of this function and back to the programme itself. Pressing the **[Esc]** key again will return you to the previously run programme, or to the **Co-ordinate File Editing** programme.

- If you are running a programme, but not any of its functions as described above, then pressing the **[Esc]** key will either return you to the previously run programme, or to the **Co-ordinate File Editing** programme.

- **Note** that this **[Esc]** function does **not** work for any of the **SURPAC CAD** programmes, as these programmes use the **[Esc]** key to carry out abort actions within the **CAD** programmes itself.

New : Auto-Compilation of a Description List

This function is only applicable to **Engineering** Format Co-ordinate File **Beacon Description Lists**. **Cadastral** Format Descriptions must comply with the Description Codes used by **SURPAC** Software.

The purpose of this function is to allow for an automatic re-compilation of a **Beacon Description List** for a Co-ordinate File for which the Descriptions used in the Co-ordinate File do not match those held in the **Beacon Description List**.

If a Co-ordinate File is imported from an **ASCII** file, for example, then it is possible that the Descriptions by the Points in the imported file may bear no resemblance to those held in the **Default Beacon Description List**.

The **Default Beacon Description List** is the list of Beacon Descriptions that is automatically attached to a new Co-ordinate File, when that file is first created.

To **Auto-Compile** the **Beacon Description List** for a Co-ordinate File, do the following :-

- Whilst in the "**Co-ordinate File Editing**" programme, click the "**Descriptions**" menu item in the "**Actions**" **Bar Menu**.

- If all the **Beacon Descriptions** used by the Points in the Co-ordinate File are included in the **Beacon Description List**, then the **Beacon Description List** form will be displayed in the usual manner.

- If not, a prompt will be displayed asking if you want **SURPAC** to re-compile the **Beacon Description List** in compliance with the **Descriptions** used by the Points in the Co-ordinate File. If you reply "**Yes**" to this prompt, then a new **Beacon Description List** will be generated, derived from the Point **Beacon Descriptions** existing in the Co-ordinate File. This process is advised before using the **General CAD** programme, to ensure that all Points are covered in this programmes **Point Layer** option.

Other Changes Made

Some other corrections and changes made to **SURPAC** are :-

- For both the **Cape Datum to WGS 84** and the **WGS 84 to Cape Datum** Transformations (**RSA** only), the option for the User to apply a **Scale Factor** to the **Source** data has been added.

- In the **Working Plan**, the problem of **Line** drawing through non co-ordinated points has been fixed.

SURPAC Programmes Modifications for Version 5.20, Release 02

New : SURPAC Project Files

This version of **SURPAC** software introduces the concept of a **SURPAC Project File** (**SPF**). Simply, an **SPF** file contains the Path and Name information of all the files associated with any given **Co-ordinate File**.

Every Co-ordinate File has its own **SPF**, which is associated by the file's **Name**, i.e. for a co-ordinate file called "**Ptn 107 Broeder.wcr**", there will be an associated **SPF** called "**Ptn 107 Broeder.spf**".

The information stored in an **SPF** is automatically accumulated as you work. Whenever you open an Observation File, Diagram File, Tacheometric File etc., the relevant file's Path and Name are recorded in the **SPF** of the current **Co-ordinate File**.

When you next use the **Co-ordinate File**, the **SPF** will search for all associated files and open them, ready for use, should they be required. This prevents the vexing problem of trying to remember the names of the associated files for a **Co-ordinate File** that has not been used for some time, for example.

Cadastral files such as **General Plans**, **Working Plans**, **Sectional Title Sheets** and **Data Sheets** have always been uniquely linked, or associated, to their parent **Co-ordinate File**. This is necessary as the drawing information contained in these Plans, or Sheets are, in general, related to the co-ordinate information held in the **Co-ordinate File**.

The following file types are now stored by an **SPF** :-

- **Tacheometric File**
- **General Observation File**
- **Level Observation File**
- **Planimetric Network Adjustment File**
- **Trig. Height Network Adjustment File**
- **Spirit Level Network Adjustment File**
- **Horizontal Alignment File**
- **Vertical Alignment File**
- **Cross Section File**
- **Longitudinal Section File**
- **Diagram CAD File**
- **General CAD Plotting File**

With the exception of the **General CAD Plotting Files**, none of the above files is unique to any **Co-ordinate File**, or **SPF**. A General Observation File, for example, can be associated with any number of Co-ordinate Files.

Modification : Field Traverse Adjustment Options

The **Field Traverse** programme offers 3 different methods of adjustment, namely :-

- **By the Helmert Transformation method,**
- **By the Bowditch Proportional Distance method, and**
- **By the Bowditch Proportional DY, DX, DZ method.**

It appears that some Users are using the Helmert Transformation method for the adjustment of traverses, for which this method is totally unsuited.

The **Helmert Transformation** adjustment technique should only be applied to traverses where the traverse Points that are to be adjusted lie within, or close to, the rectangle defined by the co-ordinates of the Start and Closing Points of the traverse.

Attempting to extrapolate an adjustment to include Points lying a long way outside this rectangle could result in unrealistic adjustments being made to the traverse Points.

The overriding principle of any transformation based on the comparison of common Points is that these common Points define a framework, within which the Points to be transformed should lie. Extrapolation beyond this framework should be avoided.

An extreme example of the above problem was brought to my attention recently, in which a traverse was run between two Points lying about 1.5m apart from each other. However, the traverse included new Points which were up to 25m away from these two control Points. The **Helmert Transformation** adjustment technique was then used to adjust the traverse.

Due to the poor configuration of the traverse, plus the fact that the distance from either control Point to the furthest traverse Point was some 17 times greater than the distance between the control Points themselves, lead to the Point co-ordinate adjustments being distorted.

To help prevent this type of problem occurring in future, the **Field Traverse** programme has been modified to issue a warning if the **Helmert Transformation** adjustment technique is attempted for a traverse for which this adjustment technique is unsuitable.

Users should be aware that the above principle of restricting transformation Points to within a framework defined by a set of common control Points, also applies to System to System transformation programmes such as :-

- **Weighted Helmert Transformations,**
- **Standard Helmert Transformations, and**
- **Polynomial (2nd Order) Transformations.**

Modifications : General Changes Made

The following problems, encountered in previous release of **SURPAC**, have now been corrected :-

- The **Areas from Co-ordinates** and **Areas from Polars** programmes : The **[Print Area]** Button in the "**Actions**" Bar Menu was disabled.

- The **General CAD** and **Working Plan** programmes : The **[F9] – Point intersect** command was not working correctly.

- The **General CAD** programme : The "**Rub a Defined Hatch**" (or **[RH]**) command was not working.

- The **Polar** programme : A manually entered **Orientation correction** of greater than 10° was inadvertently changed to a value below 10°, aft er the first of a series of Radial Polars was calculated.

- The **Tacheometric File Editing** programme : The **[Paste]** Button in the "**Actions**" Bar Menu was disabled.

- The **Sectional Title CAD** programme : The function for generating a **Participation Quota** Sheet was not working correctly for sheets greater than A3 in width.

- The **Geographical to Lo/WG** Transformation programme : When requesting input data from an **ASCII** file, the system froze.

- The **Cross Section** plotting programme : When plotting a selected range of Cross Sections for plotting, the programme would incorrectly interpret the User defined range.

- **Transformations "Lo" (Cape Datum) to/from "WGS84" (HH94)** : The **SURPAC** control files used for these transformations (and also, for the **Locate and Add Nearest Trig/TSM Beacons** programme) unfortunately omitted the **WGS 84** data for the Degree Square **DS3128**. If you do work in this area, then please re-download the file called "**SurpacUp.Zip**", available on the same Internet Page as the **SURPAC** Upgrade files (Refer to Page 1 of this document).

- The **Diagram CAD** programme : The menu item to **Re-size the Figure** was disabled. The **Re-set Text Attributes** function for changing a limited box of text items (defined by the **Frame** command), was applying the new text attributes to all the text on the diagram.

SURPAC Programmes Modifications for Version 5.20, Release 03

New : General CAD – Topographical Symbols and Line Styles

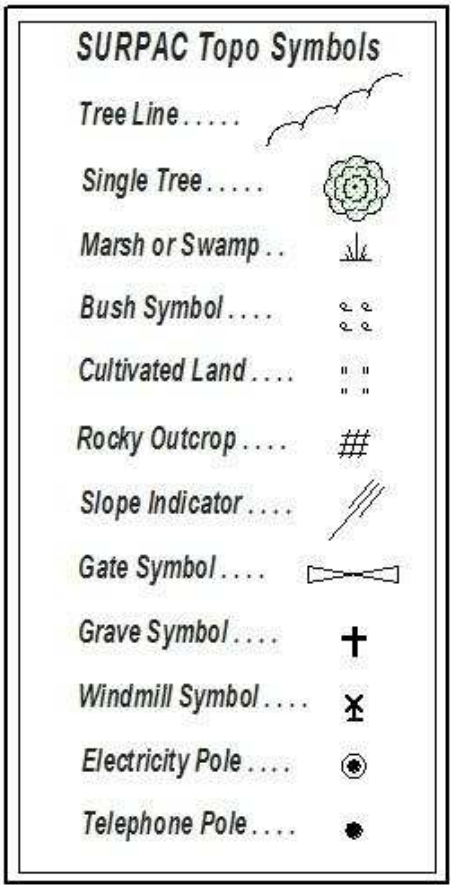
The **General CAD** programme now incorporates some useful **Topographical Symbols**, plus a new **Line Styling** option that can be used to create Lines of various styles, such as Fence Lines, Electricity Lines and Telephone Lines.

Topographical Symbols (General CAD Programme only)

To view the available Symbols, plus other related functions, click the **General CAD** main menu "**Topo Symbols**" (NB : If your PC is set to the low, 800 X 600 pixel limit, you will have to click the main menu "**Mark Pnt**", then click the menu item "**Select Mark Topo Symbols**").

To place a **Topo Symbol** on the current **CAD** Sheet, move the cursor to the desired position and **Right Click** (i.e. Click the mouse [RHB]). Click the main menu "**Topo Symbols**" heading and then click the required Symbol. (Use the Mouse Middle Button to repeat a previous Symbol selection). The following actions will then be required :-

- For the **Tree Line**, **Slope Indicator** and **Gate Symbols :** You need to identify **two** positions on the Sheet. These two positions are the limits between which the **Symbol** will be drawn. Move to the required first position and **Left Click** the mouse, move to the second position and **Right Click** the mouse. For example, if a **Gate** is required to be displayed, this Symbol will be stretched between the defined first and second positions on the Sheet.
- For the **Single Tree** : You need to specify a **Tree Radius**. Enter the required value on the form provided, and the Tree Symbol will be shown at the cursor position.
- For **all other Symbols** : No further action is required, and the selected **Symbol** will be displayed at the cursor position.


SURPAC Topo Symbols
Tree Line . . . . .
Single Tree . . . . .
Marsh or Swamp . .
Bush Symbol . . . .
Cultivated Land . . . .
Rocky Outcrop . . . .
Slope Indicator . . . .
Gate Symbol . . . .
Grave Symbol . . . .
Windmill Symbol . . . .
Electricity Pole . . . .
Telephone Pole . . . .

From the "**Topo Symbols**" menu, you can select the "**Set Symbol Options**" item to set the **Symbol Size**, **Orientation**, **Line Thickness**, **Outline Colour** and **Background** Colour.

To **Erase** (**Rub**) a **Symbol**, **Right Click** on the Symbol, then select the "**Erase Current Symbol**" menu item, found under the "**Topo Symbol**" main menu.

To **Erase a group of Symbols**, click the "**Edit**" main menu heading, select the "**Define an Erasure Polygon**" and then select "**Erase Topo Symbols**". Finally, define the Polygon in the normal manner (Left click, Middle Click, Middle Click …… Right Click)

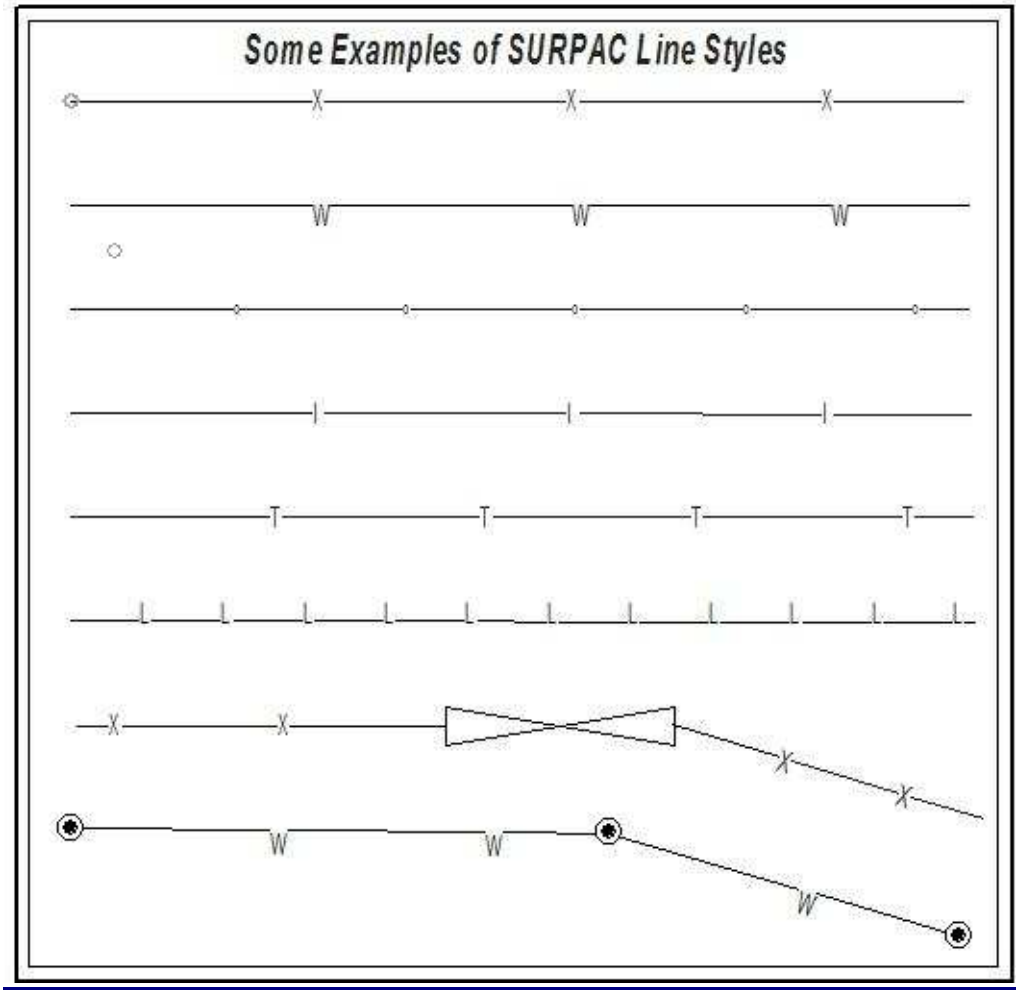
User defined Line Styling (General CAD Programme only)

Various **Line Styles** may be created using this technique. A **Line Style** is created by setting a Line pattern, which consists of a segment of solid line, followed by line gap into which is inserted an **ASCII** character. The line **segment length**, the **ASCII character** and the **character size** are all User defined.

From the **General CAD** "**Draw**" main menu heading, select the "**Set Special Line Attributes**" menu item. From the displayed form, set the required **ASCII Character**, its **size** and the **length** of the **line segment**.

From this form you can also set the position of the **ASCII** character as being either above, aligned to, or below the line itself.

To **construct the line**, use the normal mouse **Left Click** (or [**S**] command) and mouse **Right Click** (or [**E**] command).



New : “Detail Points” Category for Cadastral format Files

A new Category has been added for Cadastral format Co-ordinate Files, namely the “**Detail Points**” Category.

This category allows for the inclusion of points of detail, such as wall corners, fence posts etc. that have been surveyed, but which need to be defined and listed separately from Beacons and Working Stations.

Any Point may be defined as being a “**Detail Point**”, simply by setting the descriptive character as being “**D**”. For example, if the current Co-ordinate File Description Code for a “**Corner of Wall**” is set as **04**, then for such a Detail Point, simply set its Description Code as **04D**.

For both the **Working Plan** and the **General CAD** programmes, the “**Detail Point**” symbol is a small black square with an included white cross.

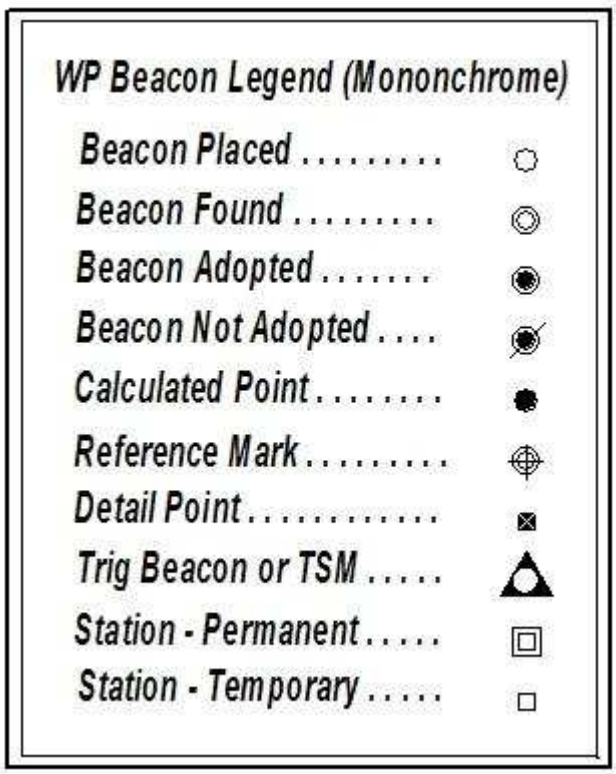
For all other **SURPAC CAD** programmes, the “**Detail Points**” category is ignored.

For the listing of a Cadastral Co-ordinate File, the inclusion of the “**Detail Points**” category is optional, as for all other categories.

New : Working Plan CAD – Monochrome Display and Symbols

The **Working Plan CAD** programme can now support **Monochrome** Sheet creation and output, as well as the standard colour format.

Users wishing to create **Monochrome Working Plan** Sheets, for the purpose of copying and or photo-reductions, can now do so by simply selecting the **Monochrome Display** option.



To switch between the normal **Colour** Display and the **Monochrome** Display, click the **Working Plan** main menu heading "**Edit**", then select either the "**Display Sheet using Standard Colour Mode**" item, or the "**Display Sheet using Monochrome Mode**".

When in the "**Standard Colour Mode**", the Sheet will be displayed using the normal colours and Point symbols as defined in the Survey Regulations.

When in the "**Monochrome Mode**", the Sheet will be displayed so that all measured lines (normally red) and grid lines (normally blue) will be displayed in **grey**. **Beacons**, **Stations** and **Trig**. **Beacons** will be displayed in **black**, as shown on the previous page.

NB : Users may include the above graphic on any **Working Plan** Sheet by using the "**Image**" functions, as follows :-

- From the Working Plan "**Image**" main menu heading, select the "**Add (Import) an Image**" item.
- From the display query form, click the "**Select an Image from a Disk File**" and click proceed.
- Set the "**Files of type**" as "**Jpeg**" and then set the "**Look in:**" item as "**C:\Surpac98**" folder.
- Select the file "**WP Beacon Legend (Monochrome).jpg** "On the Sheet, move the cursor to the required **Top Left** position for inserting the **Image** and click the mouse.
- Move the cursor to the required **Bottom Right** position for the **Image**, and again click the mouse.
- The inserted **Image** will now be visible. The **Image Size** and/or **Position** can be changed using the appropriate "**Image**" main menu options.

New : Longitudinal and Cross Section CAD functions

Both the **Longitudinal Section** and the **Cross Section** programmes have had **CAD** editing facilities added to them. This is accomplished by automatically transferring the plotting Sheet data to the **SURPAC General CAD** programme.

After creating and/or displaying either of these Section files, click the "**Plot Section**" Button, thereby indicating that the file is ready for the plotting stage.

A form will be displayed that allows you to select the **Page Size** and **Page Orientation** for the plotting sheet. If you intend to use **CAD** editing facilities on the Sheet before sending it to the plotter, then select the appropriate **Output Option** on the form and select a suitable **Name** for the **CAD** Sheet.

Once the plotting Sheet has been transferred to the **General CAD** programme, you are free to modify the Sheet, using any of the normal **General CAD** editing facilities available.

After plotting, the **CAD** Sheet will remain on disk for future use, if required.

SURPAC Programme Changes

The use of the **SURPAC Project File (***.spf**) has been modified to cater for the copying of files from one PC to another. When a project (including all its associated files) is copied from one PC to another, it is possible that the directory structure in the second PC is different from that in the first PC. To overcome the problem of non-location of associated files listed in the *****.spf** file that would arise in this case, **SURPAC** will first attempt to locate associated files at their specified locations then, if this fails, it will search the folder in which the Co-ordinate file itself is located. If this also fails, the listed associations will be discarded.

The **Cadastral General Plan CAD** programme has been modified to allow scale reductions and/or enlargements of the Sheet. For example, an **A0** GP Sheet at **1:500** can have its Sheet settings changed to **A3** at a scale of **1:2000**. This will allow plotting of the General Plan on an **A3** Sheet, maintaining the relative sizing of all items. The Sheet can then be switched back to **A0** and a scale of **1:500**.

The new SURPAC Access Code

As you would know by now, we have been forced to increase the level of security for **SURPAC** Software installations.

This new security requirement comes into force on the **6th January, 2004**, and all Users need to have obtained their new **SURPAC Access Code** by this date.

To avoid any interruptions to your usage of **SURPAC**, please do not leave this to the last possible moment.

The prior releases of **SURPAC Version 5.20** required that an obtained **Access Code** only be entered on, or after, the 6th January 2004.

However, those of you who have already obtained the new **Access Code** may input this Code immediately after implementing this current **SURPAC** Upgrade (**Version 5.20**, **Release 03**).

Any **SURPAC Access Code** obtained after implementing this **SURPAC Version 5.20**, **Release 03** may be entered immediately.

To obtain your **Access Code**, click the **SURPAC** main menu heading "**Help**", select the "**Get User Information Code**" menu item, and then e-mail (preferably) or telephone this information to **SURPAC** Software.

SURPAC Programmes Modifications for Version 5.20, Release 04

New : Topographical - SURPAC Land Levelling Routines

This new Programme provides routines for the recalculation of the surface shape of a Field, or portion of land, to enable the desirable flow of water, normally for agricultural irrigation purposes.

There are two methods by which the calculation of the new Field surface may be carried out.

The first method is by calculating a **Plane of Best Fit** through the surveyed **Field** surface. This method provides a smooth surface, with uniform slope In any given direction. It also provides a surface which is easier to create by earth moving machinery, due to the uniformity of slope. However, the total amount of earth moved (combined Cut and Fill volumes) using this method does tend to be more extensive than using the alternative method.

The second method is by using the **Individual Line Fit** technique. Using this method, the Field surface is redesigned so as to ensure that the Feeder Line, all Planting Lines and the Drainage Line have gradients that fall within User defined maxima and minima values. Whilst this method does result in a surface that has variable gradients, it does tend to minimize the total amount of earth that has to be moved.

Other routines allow for :-

- A 2-D display of the designed Field **Feeder Line**, **Planting Lines** and **Drainage Line Points**, superimposed on the existing Co-ordinate File Points, the Contour Lines (of the original Field surface), and (if required) a shaded **DTM** background display (of the original **Field** surface).
- A 2-D display of the **Cut Volume** and **Fill Volume** dispersement for the Field by comparing the original surface with the computed surface.
- A print out of the necessary **Field** setting out information for the Surveyor.
- The ability to transfer the computed **Feeder Line**, **Planting Lines** and **Drainage Line Points** to the current **Co-ordinate File**.

This new programme can be run by clicking the **SURPAC** Main menu heading item "**Topographical**" and, from the displayed menu, select the item "**Land Levelling Routines**".

Refer to the **SURPAC** "**Help**" pages for details on how to use this programme. If you would a worked example of the above programme, please email me and I will send this through to you.

Modified : Cadastral - Diagram CAD Programme

The **Diagram CAD** programme has been modified to allow for extended Line drawing and Editing functions. Up to **5000** lines may now be used on a single Diagram.

This is to make allowance for long river boundaries that are composed of a large number of small lines.

Modified : Mining – Double Back Fix Peg Calculation

There was an error in this programme which arose when one of the angles of the triangle exceeded 90°. The resulting calculation showed the two derived sets of co-ordinates as being significantly different.

This problem has now been fixed.

Modified : Least Squares – Planimetric Network Adjustment

A problem existed when generating the Network File. The first observation line was corrupted, necessitating the double entry if this observation in the Observation file.

This problem has now been fixed.

SURPAC Programmes Modifications for Version 5.21, Release 01

Important : Using Printers and/or Plotters in SURPAC

With the release of the **Windows XP** Operating System(both Home and Professional), it appears that ***Microsoft*** has managed to restrict certain interactions between applications, and the designated Default Printing device. This applies to applications (such as **SURPAC)** that use the ***Microsoft*** library function called "***Comdlg32.dll***". Whether this was by design, or by accident, is not known. One wag has suggested that ***Microsoft*** is becoming so neurotic over hackers, that it is worried that someone might access a Printer over the internet and drain all the ink out of its cartridges!

Whatever the reason, it has provided both Developers (me) and Users (you) with an unnecessary change of approach when using Printers and/or Plotters.

Please note the following ***Printer/Plotter*** protocols now used by **SURPAC** Software :-

- On running **SURPAC**, the software will use the currently defined ***Default Printer*** as the *Printer for the Calculation Pages*. This Printer must be either an **A4** size Printer set in the *Portrait* orientation, or an **A3** size Printer set in the *Landscape* orientation. If neither of these two criteria is met, **SURPAC** will report an appropriate error, and you will then need to re-define the ***Default Printer***, via the ***Window's Control Panel***.

- If you want to change the *Printer for the Calculation Pages* at any time whilst **SURPAC** is running, then do this by changing the ***Default Printer*** through the ***Window's Control Panel***.

- When you want to send a **CAD** plot (from any of the **SURPAC CAD** programmes) to a Plotter (**A0** – **A4**), use the normal **SURPAC** routine of selecting and setting the required Plotter. After completion of the output of the plotting information to the designated Plotter, **SURPAC** will resume the sending of any further *Calculation Page* printing to the ***Default Printer***. This, at least, is an improvement on the previous method, where the *Printer for the Calculation Pages* had to be re-defined after a Plotter output.

Modified : Grid Mesh for General CAD and Contour CAD

The construction of a ***Grid Mesh***, when using either the **General CAD** or **Contour CAD** programmes, has been modified. When requesting a ***Grid Mesh*** display, the programmes now include a new prompt which allows you to either :-

- Cover the entire **CAD** Sheet with the ***Grid Mesh***, or
- Restrict the ***Grid Mesh*** to a User defined rectangular area.

If the second option is chosen, move the Cursor to the **Top Left** position of the rectangle required to be covered by the ***Grid Mesh*** coverage and then Click the Mouse [LHB]. Then move the Cursor to the **Bottom Right** corner of the required area and Click the Mouse [RHB]. The ***Grid Mesh*** will now be constructed, at the User defined interval, within the defined area.

Using the "Windows XP Extended Graphics" facility

Users of the ***Microsoft*** **Windows XP** operating system should be aware of **SURPAC**'s ***Windows XP Extended Graphics facility***, employed when running any of the **CAD** programmes.

This facility is selected, or deselect, as follows :-

- In the ***Co-ordinate File Editing*** programme, Click on the **[File Options]** button.
- On the displayed **Co-ordinate File Options** form, Click on the option ***Use "Windows XP" Extended Graphics facility*** to select, or deselect the option.

When **SURPAC** is run for the first time, on a PC using **Windows XP**, it will set this facility as being active (selected).

This facility provides for a far greater "panning" area for **CAD** Sheets, whilst still allowing zooming for an on-screen viewing scale of up to 10 times greater than the designated Plotting Scale.

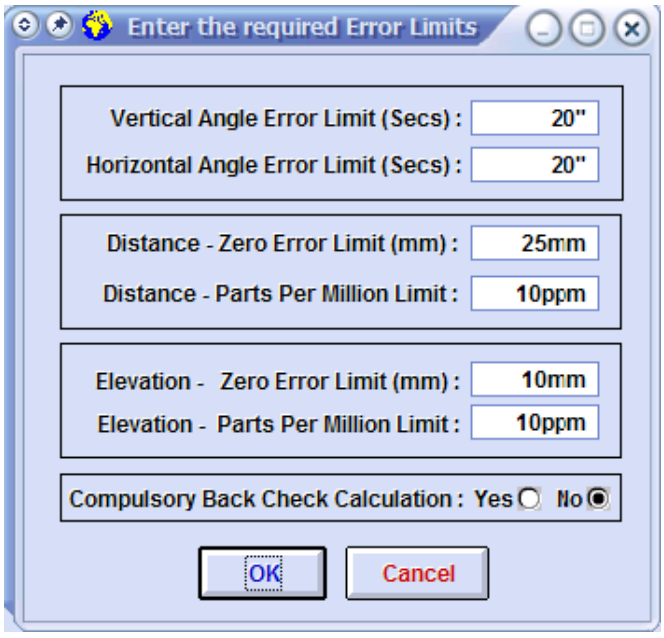
However, if you need to zoom to viewing scales greater than 10 times, you can do this by deselecting the ***Extended Graphics facility***. Once this is done, you will be able to zoom to much larger scales, but the panning area will be correspondingly reduced. In other words, the increased zooming ability is a trade off against the decreased panning ability.

Users should, therefore, set this facility according to their requirements.

Modified : Mining – Using the Peg Fix Error Limits

The setting and use of ***Error Limits*** for a **Mining Peg Fix** calculation have been modified. The angular (Horizontal and Vertical) ***Error Limits*** remain simply as a User defined value, in seconds of arc.

However ***Error Limits*** for both Distance measurement differences and Vertical Height differences are now related to a combination of a **Zero Error** and a **Parts Per Million** factor, which is applied to the horizontal distance.



The logic of this type of error limit application is that first, there is normally an allowable error (a Zero Error) for a measured linear quantity, regardless of the distance involved. Secondly, there is usually a further allowable error which is proportional to the distance involved.

For example, using a Zero Error setting of 10mm and a PPM setting of 20ppm, a distance of 50m would have an allowable error of 11mm (10 + 1), whilst a distance of 200m would have an allowable error of 14mm(10+4).

Note that the PPM factor for Vertical Height differences is also applied to the horizontal distance between the two observed points, as Vertical Height errors are also proportional to horizontal distance.

The default **Password** for the setting of Error Limits is **ABCD1234**. Users should change this Password once new settings have been made.

Modified : Control Files for Lo <> WG Transformations

The two ***Control Files*** used for carrying out Transformations between the South African "**Lo**" (*Clarke 1880 (Modified) Spheroid*) and the "**WG**" (*WGS 84 (Hartebeesthoek94) Spheroid*) Systems have been modified. The **TSM**s in the **Empangeni** area have been added to both files.

You can download the latest version of the self-extracting **ZIP** File called "***Surpac Control Files.exe***" from the same download page as the SURPAC Upgrade. When you run this self-extracting file (by double clicking its icon) the two ***Control Files*** in the "***C:\Surpac98***" folder will be updated.

Users are welcome to forward **Trig**. or **TSM** values for their area (for both systems, and either in a **SURPAC** Co-ordinate file format, or in an **ASCII** format), if these do not already exist in the ***Control Files***.

Users outside of South Africa are also welcome to forward official, common information for control beacons for transformations between their "old" (e.g. Cape Datum) and "new" (e.g. WGS 84) systems.

Modified : L/Squares Adj. Programmes – Error Tolerances

The Least Squares Planimetric Network ([Y, X] or (E, N)] Adjustment and Trigonometrical Heighting Network Adjustment programmes have been modified so as to better highlight excessive observation adjustments that might have been generated by the network adjustment.

These programmes use the Normal distribution ***Tolerance*** statistic of ***2.5 X Standard Deviation of Unit Weight*** to create an acceptance threshold. Statistically, Observation, Distance and/or Height Difference adjustments that exceed this ***Tolerance*** have a ***95%*** probability of being ***Gross Errors*** rather than ***Observational Errors***.

Observational Errors are classified as acceptable errors that arise due to sources such as instrumental inaccuracies, human errors, weather variability etc.
Gross Errors are considered to be blunders, or mistakes and normally should not be allowed to influence the network adjustment process.

These programmes now highlight any adjustment that exceeds the derived ***Tolerance*** level, by marking such an adjustment with a double asterix (e.g. -1.234**).

This makes it easier for Users to pinpoint observations that require investigation, or possible elimination from the network.

For planimetric networks, the Distance adjustments are converted into their arc angle equivalent values (seconds), in order to compare them with the network Directions.

The one proviso applied to Distance adjustments is that if a distance adjustment is less than the User defined "a priori" relative accuracy (Zero error plus parts per million factor), then it will not be considered a Gross Error, even if the adjustment does exceed the ***Tolerance*** level.

Users "Wish List"

Finally, Users are welcome to forward any suggestions for ways in which they think that **SURPAC** programmes could be improved, or extended. As day-to-day Users of the software, you are in the best position to evaluate its functions in practice.

If you have a "wish list" of functions you would like to see added to **SURPAC**, or just have some general (but pleasantly worded!) comments on the practicality of the software, then please e-mail these to **info@surpac.co.za**.

I can't make any guarantees that all wishes or comments will be acted upon, but we will do our best to accommodate reasonable suggestions, as long as these are applicable to **SURPAC** Users in general.

SURPAC Programmes Modifications for Version 5.22, Release 01

New : Extended Helmert Transformation features

The ***Standard Helmert Transformation*** programme has had two major changed made to it, namely :-

1. It now has an ***Auto-Transformation*** feature added. This option allows Users to carry out a System to system transformation, without having to identify the individual Points that are common to the two Systems, and
2. When carrying out a transformation in which the common Points are User selected, the Points in ***System #1*** (***Source***) do need to have the same ***Names*** as the corresponding Points in ***System #2*** (***Target***).

1. Carrying out an *Auto-Transformation*

The advantages of transforming using the ***Auto-Transformation*** method are obviously speed and convenience. The two files (the ***Source*** and ***Target*** files) do not need the corresponding Points to have the same Names. However, be warned that large Source files (e.g. in excess of 1000 Points) can cause the process to run slowly, especially on older computers.

The pre-requisite configurations for an ***Auto-Transformation*** are :-

- The ***System #1*** file, which is the ***Source*** file for the Points to be transformed, must be an existing **SURPAC** Co-ordinate File.
- The ***System #2*** file, which is the ***Target*** file for the transformed Points, must be the ***Current*** Co-ordinate File.
- The ***System #1*** file must contain all the common Points (control Points) required for the transformation, plus any other non-common Points that are to be subsequently transformed, based on the transformation parameters derived from the ***Auto-Transformation***.
- The ***System #2*** file must only contain the common Points (control Points) required for the transformation.
- The two files (the ***Source*** and ***Target*** files) do not need the corresponding Points to have the same Names.
- If the ***System #1*** file (***Source*** file) has a large number of non-common Points and the corresponding common Points in the two files have different Names, then it is advisable to let the common Points in ***System #1*** have Names that appear near the beginning of an alpha-numerical listing. This is to speed up searching, in large files.
- The two Systems must have a minimum of **4** common Points

There are two methods that can be used for carrying out an ***Auto-Transformation***. The first is based on ***Name matching***, and should be used if the corresponding common control Points in the two files use the same Names. This is by far the quicker of the two methods. Secondly, for files in which the corresponding common control Points use different Names, an ***Auto-Transformation*** can be carried out by letting the programme locate a ***"Shape"*** match. The programme locates a shape in ***system #2***, that extends over the limit of the area covered by the common Points. It then does a search in the ***System #1*** file for a matching ***Shape***. Obviously, the two ***Shapes*** could be of different size, orientation and/or position, but the programme is able to factor in these variables when matching ***Shapes***. *(It is, nevertheless, a fairly complex procedure, involving a large number of re-cursive calculations. For example, a **System #1** file having just 500 Points, the number of possible Shapes is 6,250,000,000 – so don't try this method with your hand calculator!!)*

Using the *Auto-Transformation* method based on Point Names – If the two files use the same Names for corresponding common control Points, then the fastest way to carry out an ***Auto-Transformation*** is by using the ***Point Names*** method. Once this has been defined as the required method, the programme will simply locate the matching Points between the two files, and then use these Points to carry out the transformation.

Using the *Auto-Transformation* method based on a common "Shape" – If the two files do not use the same Names for corresponding common control Points, then the ***Auto-Transformation*** would have to be carried out using the ***Common Shape*** method. The programme will look for a suitable Shape in ***System #2***, and then search through ***System #1*** to find the corresponding Shape. Using the common Points of this Shape for generating preliminary transformation parameters, the programme will then locate each Point in ***System #1*** that corresponds to a Point in ***System #2***.

2. Carrying out a User Defined Transformation

A User Defined Transformation is one in which the User identifies the individual common control Points to be used in the transformation. The ***System #1*** Points may be entered manually, or may be read from a **SURPAC** Co-ordinate file. The Points in ***System #2*** need not have the same Names as the corresponding Points in ***System #1***. Once a minimum of 2 common Points have been entered, the programme is then able to determine the Point in ***System #2*** that corresponds to a User defined Point in ***System #1***. Hence, it is only necessary to know the Names of two of the common Points in both of the files. Once these Points have been entered, the programme will identify the ***System #2*** Point Name once the ***System #1*** Point Name has been entered.

Thanks to Schalk Burger of Louis Trichardt for the original idea.

Modified : Cadastral - Diagram Construction/Edit Programme

A new Menu has been added to the ***Diagram Construction/Edit*** programme that allows for the importation of graphic information from another **SURPAC CAD** programme.

This function should not be confused with the existing function that allows for the creation of a ***Diagram*** by means of the User selection of Points from either a **General CAD** Sheet, or a **Working Plan**.

This new feature enables the importing of graphic information once the basic Diagram figure has been identified, normally by the User selecting the required Points from the basic ***Diagram*** Setup form.

Once the basic figure has been identified, the User may then import graphic information from :-

- Another **Diagram**,
- A **Working Plan**, or
- A **General CAD** Sheet.

The imported graphic information (Line and Text items) will be any information that lies in the Figural Plotting Area (the area outlined by a dotted grey line). Imported lines will be trimmed at the edges of the Figural Plotting Area.

The scales and orientations of the source sheets need not be same as that of the current (target) ***Diagram***.

Thanks to Michael Van Niekerk of Welkom for the original idea.

Modified : The General CAD Programme

When displaying Points, the User now has the option of displaying the Point ***Name***, the Point ***Description***, or ***both***.

These option can be found on the ***Point*** menu.

Thanks to Schalk Burger of Louis Trichardt for the original idea.

Modified : All SURPAC CAD Programmes

A global ***Text Deletion*** function has now been included. This function allows Users to identify the Text items required for deletion by selecting from a number of listed criteria. These criteria include :-

- A text **String**,
- A text **Direction**,
- A text **Size**,
- A text **WTH Ratio**,
- A text **Style**, and
- A text **Pen Number**.

Users may select any, or all, of the above criteria when defining a global ***Text Deletion***.

To use this function, select the ***Reset Text Attributes*** item from the ***Text*** menu. When the form is displayed, select the ***Action*** option

DELETE All Text items satisfying the selected Criteria

Once you have entered the required criteria, Click the [***OK***] button and the Text items fitting your selection will be deleted. If you make the incorrect selection, remember the ***UnDo*** ([**Ctrl**] + [**Z**]) button, which will restore the Text items that were deleted in the above action!

Thanks to André van der Walt of Pretoria for the original idea.

Modified : The General Observation Programme

For Users of the ***Psion Workabout*** or ***Psion Organiser***, with ***Handi-Data***'s **Booker** software, the ***General Observation*** programme will now display the ***Date*** and ***Time*** for each Set Up.

This information will also be displayed for “Raw Data” and “Field Book” printouts of an ***Observation*** file.

Observation files that were downloaded before this current version of **SURPAC** will also display the Set Up ***Date*** and ***Time***, as long as they were originally downloaded from **Booker**.

Thanks to Jaco Bruwer of Cape Town for the original idea.

New : Sending SURPAC Data to *Microsoft Excel*

Most of **SURPAC's** programmes are now able to send information directly to a ***Microsoft Excel*** Worksheet.

When printing a calculation, or a listing, this is normally sent to the **SURPAC** Print Form, before sending to the Printer. At the bottom of this Print Form are a number of User selectable options for the actual output target of the information. These have always included, the ***Printer***, an ***ASCII*** file and the ***Windows Clipboard***. Added to this list you will now find the option ***MS Excel File***.

Clicking this option will send the listing to a ***Microsoft Excel*** Worksheet. I am sure that many **SURPAC** Users could find this a convenient way of exporting information to other applications.

SURPAC Programmes Modifications for Version 5.22, Release 02

Modified : All CAD Programmes

All **SURPAC CAD** programmes (except the Diagram programme) have been modified to allow the plotting of defined portions of A0-A3 size plans on A4, graphic enabled printers.

For example, to plot an A4 portion of a sheet, do the following :-

1. On screen, display the required sheet area at the required scale.
2. Move the Cursor to position that you would like to use as the centre of the A4 plotting sheet.
3. With the Cursor in the above position, Click the Mouse [**RHB**].
4. The Cursor will move up into the Menu area, and the last used menu will be displayed.
5. If the **File** drop down menu is not displayed, the Click on the **CAD** programme's **File** menu heading to display this menu.
6. Click on the menu item : **Sheet Output – to a Printer/Plotter** .
7. Select and set up the required printing device.
8. On the **Sheet Plotting Options** form that will be displayed, make sure that the **Plot the Currently displayed Portion of the Sheet at the Current Scale** Option is selected.
9. Finally, Click the [**OK**] button.

Modified : Cadastral - Diagram Construction/Edit Programme

The following Commands have been added to the programme's **Line** menu :-

- **[LB] - Line Bisect** – This will create a new **Line**, perpendicular to and at the centre of, the current Line. Move the Cursor close to the Line through which a bisector is required, Click the Mouse [**RHB**] and then Click the **Line Bisect** menu item. The keyboard equivalent Command is [**LB**].
- **[LE] - Line Extend** – This will extend an existing **Line** from either terminal. If the **Line** is Extended to a position that is closer than the current *Snap Radius* distance to another **Line**, then the new terminal for the Extended **Line** will be Trimmed/snapped onto this **Line**. Move the Cursor close to the **Line** terminal of the **Line** that is to be Extended, Click the Mouse [**RHB**] and then Click the **Line Extend** menu item. The keyboard equivalent Command is [**LE**]. Move the Cursor in the desired direction and you will see the **Line** extend, or shrink, as the Cursor is moved. When the **Line** terminal is at the desired position, Click the Mouse [**LHB**].

Modified : Cadastral – General Plan Construction/Edit Programme

The following Commands have been added to the programme's **Line** menu :-

- **[LB] - Line Bisect** – This will create a new **Line**, perpendicular to and at the centre of, the current Line. Move the Cursor close to the Line through which a bisector is required, Click the Mouse [**RHB**] and then Click the **Line Bisect** menu item. The keyboard equivalent Command is [**LB**].
- **[LE] - Line Extend** – This will extend an existing **Line** from either terminal. If the **Line** is Extended to a position that is closer than the current *Snap Radius* distance to another **Line**, then the new terminal for the Extended **Line** will be Trimmed/Snapped onto this

Line. Move the Cursor close to the **Line** terminal of the **Line** that is to be Extended, Click the Mouse [**RHB**] and then Click the **Line Extend** menu item. The keyboard equivalent Command is [**LE**]. Move the Cursor in the desired direction and you will see the **Line** extend, or shrink, as the Cursor is moved. When the **Line** terminal is at the desired position, Click the Mouse [**LHB**].

- **[LI] - Line Intersect**

  This Command Provides for three different types of **Line Intersection**, plus a **Line Parallel**, checking facility. Intersection and **Parallel Options** can be User defined. This Command has the following Options :-

  [LIA] - Arc Intersection

  Two, non-parallel, User identified Lines will be used to form the Arc tangents of a connecting circular Arc. This Arc may be defined via a given circular radius, or a Tangent Length.

  [LIP] - Point Intersection

  Two, non-parallel, User identified Lines will be used to Intersect at a Point. The trimming of the intersecting Lines depends on the options chosen in the **[LIO]** Command, below.

  [LIS] - Splay Intersection

  Two, non-parallel, User identified Lines will be made to intersect with a Splay connection between the two Lines at the Intersection. Either the Splay Distance, or the Splay Base Distance is defined by the User. The splay Line will be calculates at the half angle of the two intersecting Lines.

  [LIC] - Line Parallel or Perpendicular Check

  If the two defined Lines are Parallel, or Perpendicular, within a User defined angular limit then this will be reported by means of a standard Windows Message Box. If the Lines are Parallel, the separation distance will also be displayed. Otherwise, the directions of the two Lines will be displayed in the Message Box.

  [LIO] - Line Intersect – Option Setting

  Use this Command to set the various Line Intersect Options**. You can define which Lines are to be trimmed in the case of a Point Intersection, whether a Radius or Tangent Distance is to be entered for an Arc Intersection, whether an Apex Distance or a Base Distance is to be entered for a Splay Intersection and finally, the angular accuracy required when Parallel or Perpendicular Lines are being checked.**

Once the required Command has been given ([**LIA**], [**LIP**], [**LIS**] or [**LIC**]) indicate the two **Lines** to be intersected, or checked, by moving the Cursor close to the first **Line**, and then pressing the Mouse [**LHB**] (or the [**Enter**] Key), and then repeating this procedure for the second **Line**.

SURPAC Programmes Modifications for Version 5.23, Release 01

Modified : All CAD Programmes

All **SURPAC CAD** programmes have been modified to allow more efficient Line identification for commands such as **[LD] – Line Dimension**, **[A] – Area**, etc. In the past, the existence of Text Items, Point circles or Marks, Contours, Grid Lines etc. all tended to disrupt the location of Lines if these items were drawn using the same colour as the Line.

The new technique employed allows the Line search routine to "see through" all non-Line items, regardless of which colour they are drawn in. The one exception to this is when large Mark Points (e.g. Circles, Squares etc. larger than 3.5mm) are used in the **General CAD** Programme. In this case, it may still be necessary to Hide (turn off) the display of the Mark Points when carrying out Line location commands.

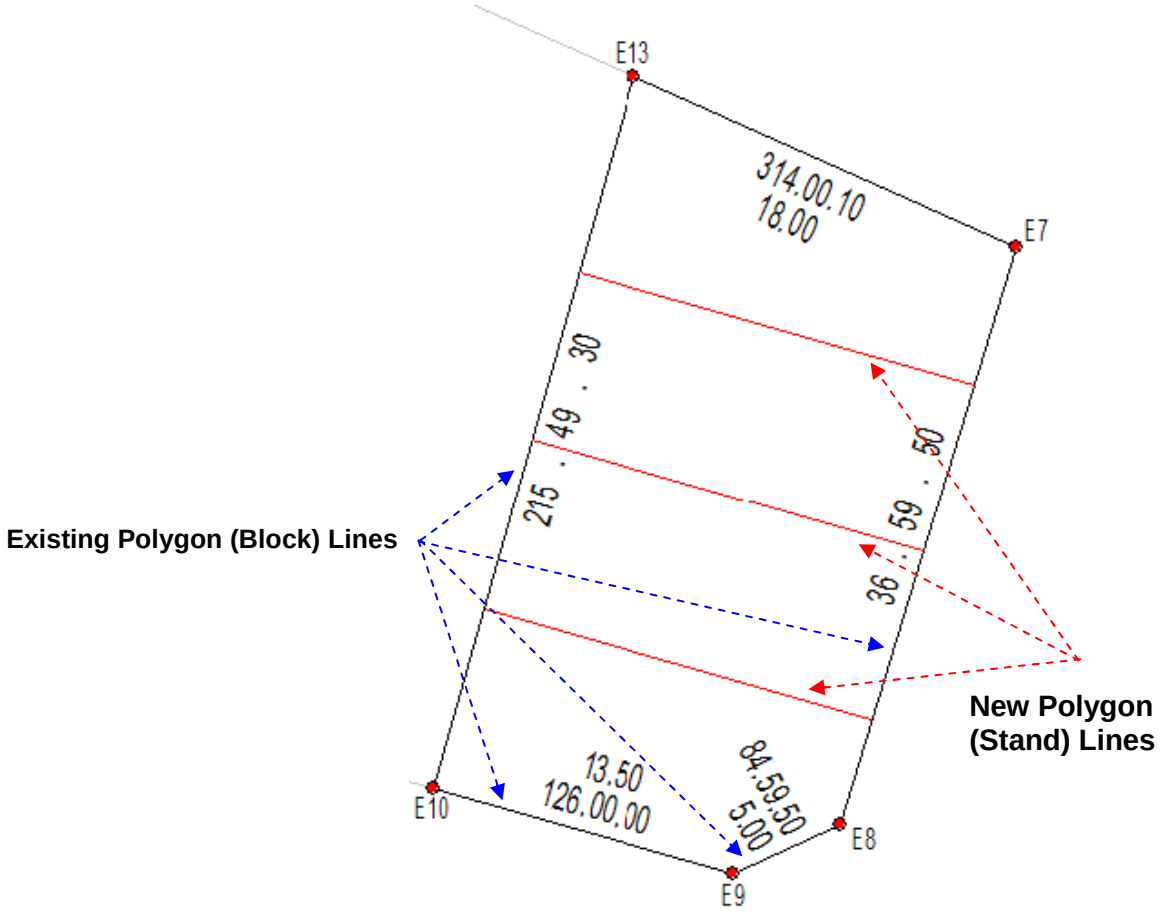
Modified : The General CAD and General Plan Programmes

The following Command has been <u>added</u> to the **Draw** (or **Line**) menu :-

<u>Fixed Area Calculations</u> [Ctrl] + [S]

As the name implies, this function will generate Polygons (or Stands, or Erven) that have a User defined **Fixed Area**. For each new Polygon generated, a minimum of 3 Polygon Lines must pre-exist in order for the programme to generate the final Polygon Line for the Polygon. These pre-existing Lines are User identified by Clicking on the Lines, in a clockwise sequence.

This function is very useful for rapidly sub-dividing a township block into stands of a prerequisite area. Up to 20 Stands may be created simultaneously with a single use of this Command.



The figure above shows a typical use of this new Command. In this example, an existing block of a newly designed township (**E7, E8, E9, E10, E13, E7**) is to be subdivided into 4 stands, each having the same Area.

To do this, first, determine the **Area** of the figure (**E7, E8, E9, E10, E13, E7**) by using the normal **[A] – Area** Command. Divide this area by four to determine the area required for each of the 4 stands.

Note :

*The **SURPAC Calculator** can be used to speed up this process. When the **Fixed Area** Command is given, the programme will check to see if the Calculator is displayed and whether there is a positive value displayed in its display screen. If so, this displayed value will be adopted as the default value required for the new polygon(s) that are to be created.*

For this example, enter the area for the total figure into the Calculator, then divide this total by 4. The resultant value will be displayed by the Calculator. Leave the Calculator displayed, and then continue with the programme.

To start the Command, Click on the programme's ***Draw*** (or ***Line***) main Menu heading, and then select the **Fixed Area Calculations** item from the displayed menu. (Or simultaneously press the [**Ctrl**] and [**S**] keys on the keyboard.)

Move the cursor close to the line **E8** – **E7** and Click the Mouse [**LHB**]. This defines **E8** as the first Point of the existing polygon and **E8** – **E7** as the direction of the first side of the new Polygon(s). You must now proceed in a Clockwise direction, and Click either the Mouse [**LHB**] or [**MB**] on all the other lines, except the last line, that are common to the existing Polygon and the first new Polygon. Finally, Click the Mouse [**RHB**] on the last line common to the existing Polygon and the first new Polygon. This will define the last Point of the existing Polygon and the direction of the last side of the new Polygon(s). The new Polygon side(s) that will be calculated will be between the first and last sides, as defined above.

For this example, Click the Mouse [**LHB**] on lines **E8** – **E9** and **E9** – **E10**. Then Click the Mouse [**RHB**] on the line **E10** – **E13**. Hence, **E10** will be the last Point of the existing Polygon and **E10** – **E13** will be the direction of the last side of the new Polygons (stands).

The programme will now display a form in which you can define :-

- the required **Direction** of the new, calculated side(s) of the new Polygon(s),
- the required **Area** of the new Polygon(s),
- the **Number** of new Polygons required.

Either select a direction from the list of directions displayed, or enter a new one. If you have used the Calculator, as described above, then the required area will be shown on the form. If not, enter the required area. Finally, enter the number of new Polygons (stands) required and Click the [**Proceed**] button.

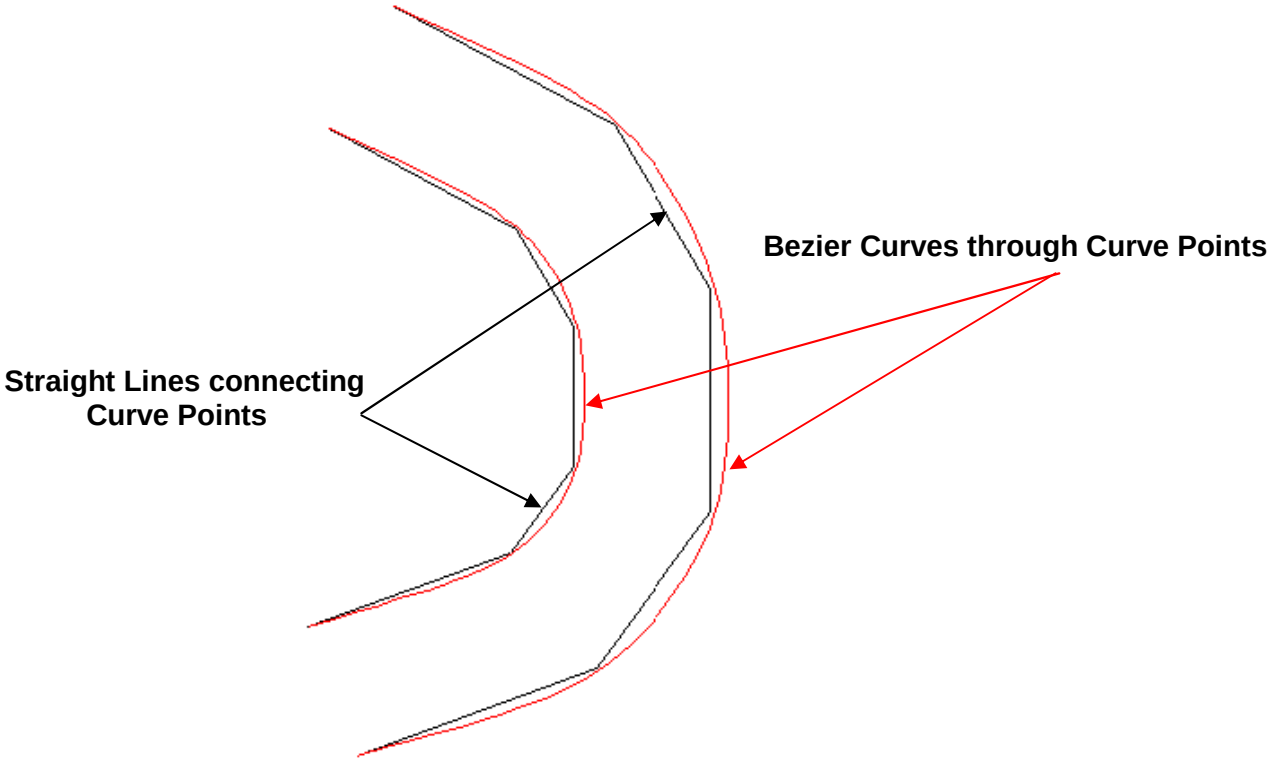
For the example, select the direction **126°00' 00"** , the area of **132.2625m²** and the number **3**. N Note that although the total number of stands in the block will be 4, we are only calculating 3 new stands. The remaining portion of the original block will form the 4th stand, and will have the same are as the 3 new stands. Shown below are the co-ordinates for the Points in this example.

Name	Y Co-ord	X Co-ord
E8	215.647	520.765
E9	220.628	521.201
E10	231.550	513.265
E13	212.948	487.496

- The number of selectable **Pen Line Colours** has now been increased to **14**. Since any **Pen Line Colour** may be switched to **Active**, or **Non-Active**, this feature effectively provides **14 Layers** for a **CAD** Sheet. When any **Pen Line Colour** is set to **non-Active** (by selecting the **Set the Active Pens (Layers)**) menu item, any **Line**, **Text** or **Hatch** item drawn with that Pen Colour is hidden from the Sheet, until that **Pen Line Colour** is reset to **Active**.

- A **new Command** has been added to the **Draw** menu, which allows for the calculation of new stands/erven by means of **Fixed Area Calculations**. See **Pages 2-3**.

- A **new Command** has been added to the **Draw** menu, which allows for the drawing (and plotting) of **Bezier Curves** though a number of User defined Points. This Command is activated by selecting the **Bezier Curve Fitting** menu item under the **Draw** menu heading. After this, simply Click the Mouse [**LHB**] on a series of positions (any position, Point or Line terminal) that you want to use to define the **Bezier Curve**. As you progress, the **Bezier Curve** will be displayed in purple. When you reach the last required position, Click the Mouse [**RHB**]. The **Curve** will now close and be drawn in the colour of the current Pen (Layer).



- A **new Command** has been added to the **Draw** menu, which allows for the **Deletion** (Erasing or Rubbing) of a **Bezier Curve**. First move the Cursor to any position close to the **Bezier Curve** that is to be **Deleted**. Do a Mouse [**RHB**] Click at this point and then select the **Delete an Item** menu item and, from the displayed sub-menu, select the **Erase a Bezier Curve** item. Otherwise, you can simply move the Cursor close the Curve and then give the keyboard Command [**RV**].

- The facility of **Printing** large **Graphic Images** has been improved. The programme can now Print full sheet Graphic Images to a plotting device, providing that the device has sufficient memory to handle the Image.

- The **Topographical Symbols** drawn on a Sheet can now be exported to a **DXF** file.

Auto-Creation of a WG (WGS 84) or an Lo (Clarke 1880 [Modified]) Co-ordinate File

This new function will automatically create a new "**WG**" **(WGS 84)** file, transformed from the current Co-ordinate file, if this current file has its System defined as "**Lo**" **(Clarke 1880 [Modified])**. Conversely, if the current **Co-ordinate File** has its System defined as being "**WG**" **(WGS 84)**, then this function will automatically create a new "**Lo**" **(Clarke 1880 [Modified])** file. All Points in the current file will be transformed and then stored in the new file. The original file will not be changed. Note that this function will only be active if you have purchased the **Conversions** Module of **SURPAC** Software, and you have the **SURPAC** Control Files installed. If you do not have the Control Files installed, these can be downloaded from the **SURPAC** Internet site, on the same page used for downloading the **SURPAC** Upgrades.

To run this function, Click the [**File Options**] button when running the **Co-ordinate File Editing** programme. On the displayed form, Click the appropriate option button that will be displayed at the bottom of the left, bottom panel and then Click the [**OK**] button. The programme will prompt for the required **Name** for the new Co-ordinate file (which will be stored in the same Folder as the current file). Enter any appropriate Name and Click the [**Proceed**] button.

On the displayed transformation form, select your required options for Point Weighting, Control Points etc. and, when ready, Click the [**Compute File**] button.

After the file transformation has been completed, you can transform other entities, such as existing CAD sheets, Tacheometric files, Contour files etc., or just print out the results of the Co-ordinate file transformation. The current Co-ordinate file will be switched to the newly created file, containing the transformed co-ordinates.

Increased size for Co-ordinate File Heading

The length of the heading that can be set for a Co-ordinate file has been extended to 64 characters. This heading will appear at the head of each printed calculation page, between the file name and the page number.

Increased size for Calculation Page item

The length of the Calculation Page item for a Point in a Co-ordinate file has been extended to 8 characters. This item is alphanumeric.

Modified "Lo <> WG" Transformation Control Files

These Control files have been modified for Trigonometrical beacons in the some of the areas in the **Free State**. The affected lists are **DS2727**, **DS2726**, **DS2725**, **DS2724**, **DS2827**, **DS2826** and **DS2825**. If you use any of these Degree Sheets, then please download the updated version of the self extracting ZIP file called "***Surpac Control Files.exe***". This file can be found on the same Internet page from which you can download this **SURPAC** upgrade (See Page 1). (*Note - You need to have the* ***Conversions*** *Module of* ***SURPAC*** *in order for this function to be active.*)

Modified – Polar Programme

When calculating a **Polar** to an existing Point, the option to **Cancel** the current calculation was not working correctly. This has now been corrected.

Modified – Data Traverse Programme

Four new buttons have been added to the programme's form. These can be found on the right hand side of the form. These buttons allow for the addition, or subtraction, of **90°** or **45°** from a currently displayed **Direction**. Please note that any entered angle may be applied to an existing Direction, as long as the entered angle is preceded by either a "**+**" or a "**-**" sign. This applies to any of the **SURPAC** programmes. (*Refer to the **Help** Pages topic **Entering Angular Values***).

Modified – Current File Printed Pages

Many Users seem to be unaware of the useful set of functions that can be displayed, and selected, by Clicking the Mouse [**RHB**] on the **Current File Printed Pages** form. The displayed menu allows the following options :-

- **Clear All Pages**
- **Delete a Page**
- **Re-Print Current Page** (New Item)
- **Re-Print all Pages**
- **Copy Pages to Clipboard**
- **Load Saved Pages**
- **Save Current Pages**

The new item (**Re-Print Current Page**) allows for the re-printing of the currently displayed calculation Page, should this be necessary.

*Please refer to the **Help** Pages topic "**Displaying the Current File Printed Pages Information**"* for an explanation of the other items available.

Modified – Co-ordinate File Security Lock

The functionality of the **Security Lock** that blocks certain usage of a **Co-ordinate File**, has been extended. Up to now, setting a **Security Lock**, by means of entering an appropriate Password, prevented any **Addition**, **Modification** or **Deletion** of Points in that **Co-ordinate File**.

The option has now been added whereby you can still block any **Modification** or **Deletion** of Points, but allow the **Addition** of New Points.

To apply a Security Lock to the current **Co-ordinate File**, Click the [**System Set**] button on the ***Actions*** Bar menu, on the left hand side of the **Co-ordinate File Editing** programme form. Click the option **Set Security Password (if required)**. A form will then be displayed informing you of the format of the Password that needs to be entered. If you decide to continue, a new form will be displayed. This form is used to enter and check your Password, and it also allows you to select the option **Allow Addition of New Points to this Co-ordinate File**.

If you select this option (i.e. the small box contains a cross) then you (or anyone else) will be able to **Add New Points** to the file, but will not be allowed to **Modify** or **Delete** any existing Points (even those Points you Add).

If you do not select this option (i.e. the small box is empty) then nobody will be able to **Add**, **Modify** or **Delete** any Points. This means that the file can only be used for displaying and/or printing its contents.

Any Co-ordinate File having a Security Lock can have this lock removed by again Clicking the [**System Set**] button on the ***Actions*** Bar menu, then Clicking the option **Remove existing Security Password** and giving the necessary Password.

Modified – Sending a Co-ordinate File to a *Microsoft* Excel file

This function has been improved, in that the information transferred to the **Excel** spread sheet file now conforms to the **Options** set for the **Co-ordinate File Listing**, and does not simply contain the entire file, as was the case before.

For example, if you need to create an **Excel** spread sheet containing only Points having a certain Description, then make sure that on the **Options for Co-ordinate File Listing** form, the **Use Point Description** option is set to **Yes**, and that the Description entered is the one required. Once the list is displayed, Click the [**MS Excel File**] button at the bottom of the display form. The list, as displayed, will be sent to a new **Excel** spread sheet and this sheet will be displayed. (*Assuming that you have **Excel** installed on your computer*).

Modified – Manual entry of Observation Data for Resections and Trilaterations

This function applies to the **Least Squares Adjustment**, **Single Point Fix** programme. Users may now elect to manually enter observations into the calculation form, or (as before) read the data from a pre-loaded Observation file.

Note, that in the case of directly, or manually entered data, these data will not be stored for any future use. Once the calculation has been completed, the entered data will be lost. Furthermore, only a single arc (or information from a manually meaned set of arcs) may be entered. The idea of this new option to manually enter data is to provide the User with a quick calculation for something like a 3 or 4 point resection, while in the field.

Modified – Entering of New Point co-ordinates in the Join and Polar Programmes

Both the **Join** and **Polar** programmes have been modified to allow for the option of directly entering co-ordinate data for new Points. This applies to both the "**From**" and "**To**" points in the **Join** programme, and the "**Polar From**" Point in the **Polar** programme.

If you enter a Point **Name** that does not exist in the current **Co-ordinate File**, the programme will move into the "**Y Co-ord**" display box and wait for you to enter a value. Once this value has been entered, press the [**Enter**] key and then enter the "**X Co-ord**" value, followed by the Point **Height**, if this is required. In the **Join** programme, you can also enter a new Point's **Description**.

These newly entered Points will be added to the current **Co-ordinate File** and will be available for future use.

Modified – Contour CAD Programme (Spot Heights Menu)

A new menu item has been added, namely the **Description Only (Circle)** item. This item allows for the display of **Tacheometric** file Points by means of a **Circle** at the point position, plus a display of the Point's **Description Code**.

Modified – Tacheometric Editing Programme

The option of **Replacing** Null items (such as blank Descriptions) with a User defined value was not working correctly. This has now been corrected.

The option of displaying a list of Points restricted to a User defined **Description** was also not working correctly, and this has now been corrected.

Modified – All CAD Programmes

The **Reset Text Attribute** function (found under the menu Heading **Text**) has been modified to make it easier to switch the **Font** of all existing **Text** items. If no editing of any of the **Text** attributes is requested, then the function now allows you to define a new **Font** that will be applied to all existing **Text** items. This function would be very useful when needing to change the **Font** of **Text** items in the case of switching the plot from an **Inkjet** plotter to an

older **Pen** plotter. **Pen** plotters can only support the **SURPAC Line Font**, whereas **Inkjet** plotters support any of the **True Type Fonts**. In this case, this function can be used to quickly switch the Font of all the **Text** items to the **SURPAC Line Font**.

SURPAC Programmes Modifications for Version 5.23, Release 02

Modified : All CAD Programmes – Graphic Memory Allocation

All **SURPAC CAD** programmes have been modified so as to improve the usage of available graphic memory.

*Please note that this modification is only available for computers running the **Microsoft Windows XP (Home** or **Professional**) Operating System*.

In the past, Users have had to choose between allocating available graphic memory to either the **Pan** function (the displayable area of the current **CAD** Sheet at the current display scale), or the **Zoom** function (the ability to zoom-in to a portion of the **CAD** Sheet, to display it at larger scales).

This process has now been automated. **SURPAC** will now automatically allocate the available graphic memory to the **Pan** and/or **Zoom** functions, depending on the current **CAD** Sheet size, scale and **Zoom** factor. This process is seamless and does not require any prior settings or action on behalf of the User. With this current method, the **Zoom** factor is virtually unlimited, regardless of the defined Sheet plotting scale.

New : Co-ordinate File Merging Option (New or Updated Points)

With this new function, it is now possible to **Merge** Points into the current Co-ordinate File, from a source Co-ordinate File, for Points which are either :-

- New Points (i.e. they do not already exist in the current Co-ordinate File), or
- Updated Points (i.e. common Points existing in the two Co-ordinate Files, but where Points in the Source Co-ordinate File have been modified and are newer than those in the current File).

This function is useful, for example, if two people are working on the same Co-ordinate File, but are not able to share the file on a network. New Points calculated and existing Points modified by the one person can be merged into the second person's file at any later time.

To use this function :-

- When running the "**Co-ordinate File Editing**" programme, Click the [**File Options**] button in the ***Actions*** bar menu on the left of the screen. Select (Click) the top left hand option "**Merge Data from another Co-ordinate File**" and then Click the [**OK**] button.

- From the displayed File Selection form, select the ***Path*** and ***File Name*** of the **Source** file.

- On the displayed "**Co-ordinate File Merge Options**" form, select (Click) the option "**New & Updated Points**", and then Click the [**OK**] button.

- The programme will warn you that it is about to overwrite and/or add data, and give you the opportunity to abort from the routine. If you choose to continue, all new Points in the Source file will be added to the current file and all modified Points that are newer than those in the current file, will be used to overwrite the corresponding Points in the current file.

General Programme Additions and Modifications

Local System Surveys – Option to Suppress Sea Level & Scale Enlargement corrections

When defining a Co-ordinate **System** as **Local**, it is now possible to suppress the application of the Sea Level & Scale Enlargement corrections.

When defining the **System** as being **Local**, the System Set form will make this option available, with the default value set to **OFF**. If you want the programme to apply the corrections, then select (Click) the displayed option so that the small option box displays a cross.

For all other, **non**-**Local Systems**, this option is set to **ON** and cannot be changed.

If you want to change the Sea Level & Scale Enlargement correction setting for an existing, **Local System** Co-ordinate File then :-

- When running the "**Co-ordinate File Editing**" programme, Click the [**System Set**] button in the ***Actions*** bar menu on the left of the screen. On the displayed form, Click the option "**Apply Sea Level & Scale Enlargement corrections**", which will toggle the selection to either **ON** or **OFF**. Finally, Click the [**OK**] button.

Contour CAD programme

The problem with defining the Plotting Scale has been fixed up. This problem only arose if the "thousands separator" had previously been set to a comma or period (full stop).

Observation File Load/Edit programme

- When using the "**Mean any Multiple Sightings to Points within a Set-Up**" option, the programme returned a value 180ºin error, if one of the sightings to be meaned was 0°.00'.00". This has now been fixed.

- The "**Merge a File**" function was not working properly and has now been fixed.

SURPAC General CAD programme

Three new **Tree Symbols** have been added to the **Topo Symbols** menu heading. All **Tree Symbols** now have the option of having their background shaded in a light green colour, except Tree Type #2 which shows bare branches.

This shading function can be turned **ON**/**OFF** by selecting the appropriate option on the **Set Symbol Options** form. The **Set Symbol Option** form can be displayed by selecting this menu item from the **Topo Symbols** menu heading.

Least Squares Planimetric Network Adjustment programme

The calculation of provisional co-ordinates within the programme has been extended so as to include provisional Point calculation by means of a resection, if applicable.

There was a bug in the routine for calculating provisional co-ordinates, that limited the process to a single iteration, instead of a multi-iteration one. This could have resulted in the programme reporting that "*Provisional Co-ordinates for Point XXX could not be calculated*",

forcing the User to generate provisional values from some other routine. This has now been fixed.

Level Observation File Edit/Load and Spirit Level Network Adjustment programmes

Both of these programmes have been modified to allow the level readings and height differences to be displayed to up to 5 decimal places. Users can now select an accuracy of 2, 3, 4, or 5 decimal places, with the default being 4 decimal places.

The required accuracy setting options can be found near the bottom of the **Level Observation File Load/Edit** programme form. This setting should be made before downloading from an instrument, or importing from an **ASCII** file.

When running a **Spirit Level Network Adjustment**, the programme will detect the accuracy setting in the associated **Level Observation** file, and use this same accuracy for the calculation and display of the **Level Network**.

Trigonometrical Height Network Adjustment programme

This programme has been amended to handle up to **100** sightings per **Set**-**Up**. The previous limit was 60.

Longitudinal Sectioning programme

This programme has been amended to include the option of fitting a **Spline Curve** through the section positions, as opposed to just joining the positions with a series of straight lines. This option can be **selected**/**deselected** via the [**Set Options**] button on the ***Actions*** menu bar. The default value is **selected**.

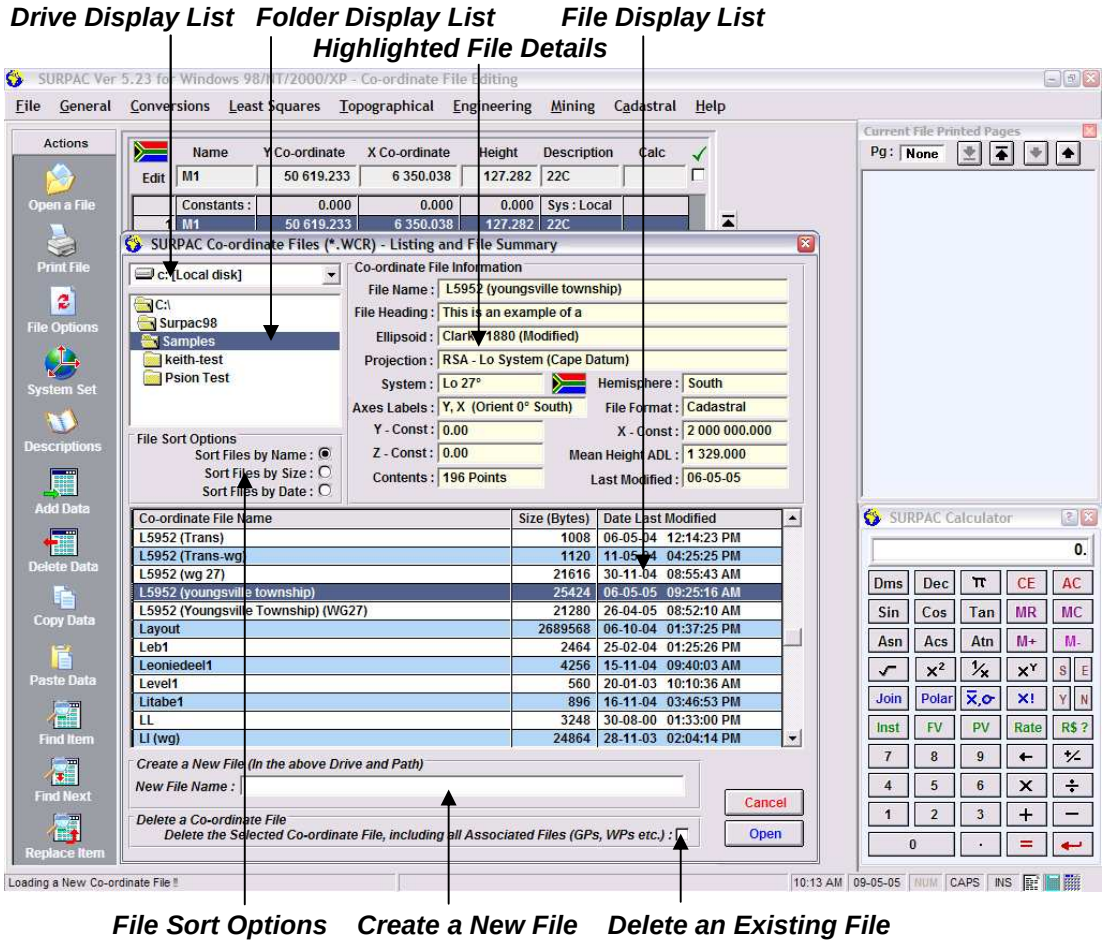
Sectional Title CAD programme

The problem with the "**Mid Wall**" calculation routine has been fixed.

SURPAC Programmes Modifications for Version 5.23, Release 04

Opening/Creating/Deleting a Co-ordinate File

A new option has been added for **Opening**, **Creating** or **Deleting** a **SURPAC** Co-ordinate File. Using this option, a more informative file layout is displayed by the programme.



The diagram above shows the various elements of the display form. On this form you can :-

1. Select a **Drive** by Clicking on the small down arrow of the **Drive Display List** to display the available Drives, and then Clicking on the required **Drive**.
2. Select a **Folder** by scrolling through the **Folder Display List** shown for the selected Drive, and then Clicking on the required **Folder**.
3. **Highlight** any of the existing **Co-ordinate Files** shown in the **File Display List** by Clicking on the required File. When a File is **Highlighted**, its basic information will be shown in the top right panel of the form. This information includes most of the data shown in the "System Set" function in **SURPAC**, as well as the number of Points in the file and the Date that it was last modified.
4. **Sort** the File Display List by **Name** (the default option), **Size** or **Date**. Sorting is always in increasing order, lowest to highest, earliest to latest etc.
5. Enter a required **Name** for the creation of a **New Co-ordinate File**.
6. **Delete** any existing **Co-ordinate File**, along with its ancillary files. These ancillary files include all files related to the Co-ordinate File that is to be deleted, including Description Files, General Plans, Working Plans, Print files etc.

When you invoke this programme, the default **Co-ordinate File** highlighted and displayed is the **current Co-ordinate File**. To locate a **Co-ordinate File** in the Listing, you can either use the scroll bar on the right of the listing, or start typing in the required file Name. As you type you will see the highlighted file in the listing being changed correspondingly.

If you would prefer to retain and use the previous method for **Opening/Creating a Co-ordinate File** then do the following :-

Whilst running the ***Co-ordinate File Editing*** programme, Click on the ***[File Options]*** button in the ***Actions*** Menu Bar. In the bottom right panel of the displayed **File Options** form, de-select the option ***Open Co-ordinate Files using SURPAC format*** and then Click the ***[OK]*** button.

General Programme Additions and Modifications

New - Observation File : Option to apply an Orientation Swing to a Defined Set Up

This option allows for a swing to be applied to all observations made from a User defined Set-Up in an Observation file. A single Set-Up, or multiple Set-Ups may be selected. This function is useful for applying a gross orientation correction to a Set-Up, or a series of Set-Ups.

To use this option, run the ***Observation File Editing*** programme and load the required **Observation file**, then Click the ***[File Options]*** button in the ***Actions*** menu bar. From the displayed File Options form, select the item ***Add/Subtract a Value to/from all Directions at a defined Set-Up*** and then Click the ***[OK]*** button.

On the displayed form, enter the **Angle to be Applied**, select (tick) the Set-Ups to which this angular swing is to be applied and then Click the ***[Proceed]*** button.

The problem in creating an ***.OBA** text file from an **Observation File** has also been corrected.

Modified - Diagram CAD programme

The following **DXF** output problems in the **Diagram CAD** programme have been fixed up :-

- The **Point Circle** sizes have been changed to correspond with their screen sizes,
- The Figural **Lines** have been trimmed at the Point Circle positions,
- The **Circles** inside the Trig. Beacon symbols have been corrected.

The **Figure Area [A]** command has been re-instated. This was previously done away with due to the existence of the **Data & Consistency [Ctrl]+[D**] command, but it seems some people prefer to use the **[A]** command for Areas.

The **Data & Consistency [Ctrl]+[D]** display form now includes a comparison between the written Area on the Diagram and the values determined from both Polar and Join methods (from the Diagram data listing).

Modified - Standard Helmert Transformation programme

The problems associated with entering manual data have been fixed up. It is now possible to define a Co-ordinate File as input for System #1 and at the same time enter other data manually.

Modified - Write Text [WT] Command : All CAD programmes

The **Write Text [WT]** command now uses the last **Direction** calculated when using the **Line Dimension [LD]** command, as the default direction. If you want to write a Text item parallel to, perpendicular to or at 45° to a given line then first move the cursor close to the required

line and then give the **[LD]** command. Then move to the require location for the start of the Text item and give the **[WT]** command.

The **[WT]** input form now includes buttons that allow for changing the displayed **Direction** by either [+90°], [-90°], [+45°] and [-45°] degrees.

In all cases of **Text Direction** calculation, the programme will adhere to the normal GP principles of the Text being written from left to right. For example, if you have a displayed **Direction** of 196.2° and you Click the [-90°] button, the ne w **Direction** displayed will be 286.2° and not 106.2°. If you want to use a Directi on of 106.2° then you have to enter this value manually.

Modified - Single Point Fix : Manual entry of Measured Distances for Trilaterations

This function applies to the **Least Squares Adjustment**, **Single Point Fix by Trilateration** programme. Users may now elect to manually enter distances directly into the calculation form, or (as before) read the data from a pre-loaded Observation file. Regardless as to which direction the measurements were actually made (forward or back), with manual data entry the calculation will take the form of a Set-Up Point with distances measured in a forward sense.

Note, that in the case of directly, or manually entered data, these data will not be stored for any future use. Once the calculation has been completed, the entered data will be lost. The purpose of this new option to manually enter data is to provide the User with a quick calculation for a Trilaterated Point.

Modified – Point Name Sorting Routine : All programmes

The Point Name sorting routine has been extended and improved, allowing for correct sorting when using more complex names such as SHALU2D1. These names are more complex in the sense that the contain two separate number blocks and need to go through a double sorting routine to ensure their correct placement in the listing.

Modified – Option to toggle ON/OFF the SL&SE Corrections : All programmes

When setting up, or modifying a Co-ordinate File's System parameters, it is now possible to select (**ON**) or deselect (**OFF**) the **Datum Level & Scale Enlargement Correction** function for measured distances. Previously this option was only available for Local System surveys, but it is now available for all projection Systems such as Lo, WG, UTM, Bessel, OSGB36 etc.

The reason for changing this option is to make allowance for Users who wish to apply the SL&SE corrections in the instrument and to prevent the occurrence of duplicate corrections being applied. NB : Turning this option **OFF** should be done with caution. If incorrectly used, it could result in the corrections not being applied at all!

When you create a new, non-Local System Co-ordinate File, the option is automatically turned **ON**. Toggling the option **ON** or **OFF** is done by either Clicking the ***[System Set]*** button in the ***Actions*** menu bar when the ***Co-ordinate File Editing*** programme is running, or Clicking the ***File*** main menu heading and then selecting the ***Reset Co-ordinate File System*** menu item. The option is located at the bottom of the bottom of the upper panel of the form that will then be displayed.

SURPAC Programmes Modifications for Version 5.23, Release 05

Importing and Exporting of AutoCAD DWG (Drawing) Files

A new option has been added to the various **SURPAC CAD** programmes that allows for the Importing and Exporting of **AutoCAD DWG** (Drawing) files. This option is over and above the existing option of importing **AutoCAD DXF** (Data Interchange Files).

Although the Import option has been satisfactorily tested using **DWG** files derived from various sources, the intention is to maintain compatibility with true **AutoCAD** formats.

Importing and exporting of **AutoCAD DWG** files uses similar routines as those used for **DXF** files. For importing, Click the ***Import*** main menu heading and then select the item ***Import from an AutoCAD DWG File***. Follow the on screen prompts to select the required **DWG** file and its required Layers.

For creating and exporting to an **AutoCAD DWG** file, Click the ***File*** main menu heading and then select the item ***Sheet Output - to an AutoCAD DWG File***. Follow the on screen prompts.

SURPAC can also import **Point** information for direct storage into the current **Co-ordinate File**. To do this, run the **Co-ordinate File Editing** programme, and then Click the ***[File Options]*** button. In the top left hand panel of the displayed form, Click the option ***Import Point Data from an AutoCAD DWG or DXF File*** and then Click the ***[OK]*** button. When selecting the required input file, make sure that the **File Type** is set correctly (i.e. **.DWG** or **.DXF**).

The import and export functions in the various **CAD** programmes have been tested using **DWG** files from various sources. Should you experience any problems with these routines, then please let me know by e-mailing the file(s) to me with an explanation as to which of the import/export you were using when the problem occurred.

General Plan Programme – New Function [Ctrl] + [C]

[Ctrl]+[C] - Areas with Data and Point Co-ordinate Checking

*NB : This new function is over and above the pre-existing **[Ctrl]+[D]** function which carries out a data consistency check, without reference to any Point c-ordinates.*

The **[Ctrl]+[C]** function computes progressive Polars around a closed polygon (representing a Stand/Erf, for example) and carries out a comparison between co-ordinates derived from the Polar data and the Point co-ordinates stored in the Co-ordinate File. The Polar data are obtained by using the Mouse cursor to select required Text Items, displayed on the current **General Plan** Sheet, that represent Directions or Distances (Sides) applicable to a defined Stand/Erf.

Once the required **GP** Sheet has been loaded, set the **GP** Sheet to a reasonable scale and in a position such that the required Stands/Erven are, or can be, displayed.

To activate the function, first move the mouse cursor into the centre of the Stand/Erf whose Area and Consistency is to be checked, and then either Click the mouse [**RHB**], or simultaneously press the **[Ctrl] + [C]** Keys. If the former method is used, then, click the programme's "Data" main Menu heading, and then select the Menu Item called "***Data & Co-ord Checking***".

On the displayed **Area & Consistency** form, enter the Stand/Erf Number for the Stand/Erf that is to be calculated. (NB : If the **Select the Stand/Erf Number nearest Cursor** option on the form is selected, and the Stand/Erf number exists on the **GP** Sheet, then this number will be shown automatically).

The **Area & Consistency** form will display the instruction ***Click on the required Starting Point!!*** Before the programme can begin co-ordinate comparisons, it requires that you indicate the Point from which the comparative data will begin. To do this, on the **GP** Sheet move the Cursor close to any Point pertaining to the Stand/Erf being checked, and Click the mouse **[LHB]**. The Name and co-ordinates of this Point will now be displayed in the first line on the **Area & Consistency** form.

Move the cursor onto the beginning (lower left corner) of the Direction (or Distance) Text Item on the **GP** Sheet that relates to the Stand/Erf boundary line going in a clockwise direction, from the selected Point to the next Stand/Erf Point, and then click the Mouse [**LHB**].

NB : *If the displayed **Direction** you want to select is **180°** out of bearing, click the **Mouse [RHB]** when selecting the item instead of the **[LHB]**. When the **Mouse [RHB]** is used, for selecting a **Direction**, the **Direction** is automatically changed by **180°**. There is also a Button on the form that allows you to change an existing **Direction** that is **180°** out of bearing.*

*The order of selecting **Direction** and/or **Distance** is immaterial, as the programme is able to differentiate between these two types of data items.*

You should now see the **Text Item** selected displayed under the appropriate heading on the **Area & Consistency** form. Repeat the above for the other necessary Polar element **Direction** or **Distance**.

Once both a **Direction** and a **Distance** have been selected for a boundary line, the programme will compute the Y and X (or E and N) co-ordinates and then use these values to search the **Co-ordinate File** for the Point nearest to this position. It will then compute the DY and DX values (Y and X differences) between the computed position and the stored, Point position. The Point Name and stored co-ordinates will be displayed along with the DY and DX values.

NB : *If no stored Point can be located within 5 metres of the computed position, the programme will display the value "No Point" in place of the Point Name, and the remaining items will be left blank.*

Continue selecting pairs of **Directions** and **Distances**, going in a continuous clockwise direction, until you close back on the starting Point, at which point the **Area** for the Stand/Erf will be calculated using the entered Polar data.

To **Store** the **Area** for the **GP** Data Sheet, click the [**Store Area**] Button. Once an **Area** is **stored** (in the associated *****.wga** file), along with its Stand/Erf Number, the stored data are used by the **Data Sheet** programme to automatically construct the **Data Sheet** Area Lists.

On completion (and Printing, if required), click the [**New Area**] Button to start the **Area** calculation for the next numbered Stand/Erf. To select a different Number, enter the required Number into the [**Stand/Erf**] drop down list.

Data generated by means of **Text Item** selection cannot be modified on the **Area** form, other than changing a **Direction** by 180°. However, by using the Buttons provided, a Data line may be **Deleted**, or **Inserted**.

To **Delete** a Line, click the required Line to highlight it, then click the [**Delete Data**] Button.

To **Insert** a Line, click the Line below the required insertion position, then click the [**Insert Data**] Button. Finally, select the required **Text Items** from the **GP** Sheet to represent the **Direction** and **Distance** for the inserted Line.

Once an **Area** has been calculated (by entering sufficient and correct Data to close the polygon) the [**Print Area**] Button will become active, and allow for the printing of the **Area** and Consistency information.

Setting SURPAC to run on a PC having a "Limited Account" User

Many companies require that their PC Users have only limited access to sensitive folder and files on the PC. ***Microsoft*** operating systems such as **Windows 2000** and **Windows XP** provide the facility of setting up **Limited** accounts, which restrict their users from modifying files in certain folders, such as the **WinNT** folder (for **Windows 2000**), or the **Windows** folder (for **Windows XP**). As **SURPAC** normally locates its security files in these folders, it is necessary to get **SURPAC** to carry out certain file modifications to enable Users with **Limited** accounts to run **SURPAC**.

If you intend setting **SURPAC** for use from a **Limited** account, please do the following :-

1. **Installing SURPAC** Software : The installation must be done using an account that has **Full Administrator** rights on the computer. This is important, as the installation process will require access to the "**C:\Windows**" (or "**C:\WinNT**") folder in order to correctly install the **SURPAC** components. Trying to install **SURPAC** from a **Limited** account will cause the installation to fail.
2. Remaining in the **Full Administrator** account, run **SURPAC** software. Click on the **File** main menu heading and then select the menu item ***Set SURPAC for Limited Account use***. The software will first ask you to confirm that you want to set **SURPAC** for a Limited account and then proceed to modify the necessary files to enable this option.
3. You can now close down **SURPAC** and then log off from the **Full Administrator** account. When you next log on using the **Limited** account, you will be able to run **SURPAC**.

General modifications made to SURPAC Software

Observation File Loading/Editing programme : Field Book printing

The left hand margin of the printed **Field Book** sheets, for both output methods, has been widened to approximately **15mm**, to allow left hand page binding.

Importing Beacon Descriptions when Merging data from another Co-ordinate File

When using the option to Merge data from another **SURPAC** Co-ordinate File (the source file), it is now possible to set the **Beacon Description** lists (Cadastral and Engineering) for the current Co-ordinate File to be the same as those of the source file.

Diagram CAD Creating/Editing/Plotting programme

The two functions **Data Line Insert** and **Data Line Delete** were not working correctly. This problem has now been rectified.

When entering information for defining a **Connection** or **Indicatory** Point, the co-ordinates for the first (figural) Point were not being picked up correctly by the programme, if the Point definition was by means of entering the Diagram letter (as opposed to Clicking the Point Name in the File Name listing). This has now been rectified.

General Plan CAD Creating/Editing/Plotting programme

The **Write Line Distance** command ([**U**]) has been improved. When using this command to Write the **Distance** along a stand boundary, the programme will combine the boundary line portions, in the event that the boundary is composed of a series of continuous, parallel lines.
When **Viewing** a Point ([**V**] command), or **Modifying** a Point ([**M**] command), on a **General Plan**, the display form now include the **Name Position**, and not the Point Height.

When creating an **Inset** using the [**FD**] (**Frame Define**) and [**FZ**] (**Frame Zoom**) commands, the **Circle** and **Name** size of any Points included in the **Inset** will now assume the same **Zoom** ratio as the text items in the **Inset**.

Creating ASCII files from a Co-ordinate File

When creating an **ASCII** file of a **Co-ordinate File**, you can now specify if you want the **[Y**, **X**, **Z]** Constants to be applied to the co-ordinates, or whether you want them left off.

Applying Shifts to Co-ordinates in a Co-ordinate File

When using the **Apply Shifts to Y, X and/or Z Co-ordinates** option, it is now possible to define the entire file for applying the defined Shifts, or to restrict the Shift application to User selected Points in the file. This option is found by Clicking the ***[File Options]*** button when in the ***Co-ordinate File Editing*** programme.

Modified - Single Point Fix : Manual data entry for Forward Intersections

This function applies to the **Least Squares Adjustment**, **Single Point Fix by Forward Intersection** programmes. Users may now elect to manually enter observations directly into the calculation form, or (as before) set the programme to read the data from an Observation file. The observations must be manually pre-oriented and entered as oriented, forward Directions. Manual data may be entered for fixing Points in [**Y**, **X**] (or [**E**, **N**]) or [**Y**, **X**, **Z**] (or [**E**, **N**, **H**]).

Note, that in the case of manually entered data, these data will not be stored for any future use. Once the calculation has been completed, the entered observational data will be lost. The purpose of this new option is to provide the User with a “quick” calculation for a Point to be fixed by forward intersection. Users downloading observations from a Logger, or Total Station, are advised to use the existing method of loading raw, un-oriented data from an Observation file.

Modified – Sending data to the Windows Clipboard

The amount of data that may be sent to the **Windows Clipboard** has been substantially extended. This applies to all programmes that are able to send data to the **Clipboard**. These new limits are applicable to **Windows XP** (**Professional** and **Home** versions) and **Windows 2000**. Users still operating under **Windows 98**, however, might not be able to take advantage of these new extensions.

Using a USB -> RS232 Converter Cable for Downloading Observations and Co-ordinates

Most Laptops now appearing on the market do not have an **RS232** communications port. These have been replaced by the more flexible **USB** ports, which is fine except that many survey data Loggers and or Total Stations only have **RS232** output ports. This necessitates using a converter cable when downloading, or uploading, between any of these devices and **SURPAC** running on a PC/Laptop without an **RS232** port.

Tests made using **Booker Versions 5.1** and **6.1**, running on a **Psion Organizer** and a **Psion Workabout** respectively, showed that small time delay modification had to be inserted into the **SURPAC** download routines in order to prevent a loss of data being sent from the **Psion**. With the time delay added, these functions now appear to be working correctly.

The same time delay has also been included for all other download options (**Leica**, **Pentax**, **Sokkia**, **Topcon** etc.). Should you still experience any incorrect downloading of data using any Logger or Total Station in conjunction with a **USB -> RS232** converter cable, then please let me know.

Setting a Co-ordinate File for Printer output to the VPG (Virtual Pages) option

Once a particular **Co-ordinate File** has been set to send the printer output to the **Virtual Pages (*.vpg** file) then this state should persist unless changed by the User. In the past, the printer output state would revert back to the physical printer whenever the **Co-ordinate File** was reloaded.

This has now been corrected. When reloading a **Co-ordinate File** that was previously set to use the **Virtual Pages**, this condition will automatically be reset. When this happens, a prompt will be displayed, showing that the printed calculation pages for this file will be sent to the **Virtual Pages** and not to the physical printer.

Polar programme – Setting a Direction parallel to defined Points

The **Polar** programme displayed an erroneous result when a **Direction** was defined by setting it parallel to the line joining two Points existing in the file. This has now been corrected.

Sectional Title CAD programme – Areas and Mid Wall Calculations

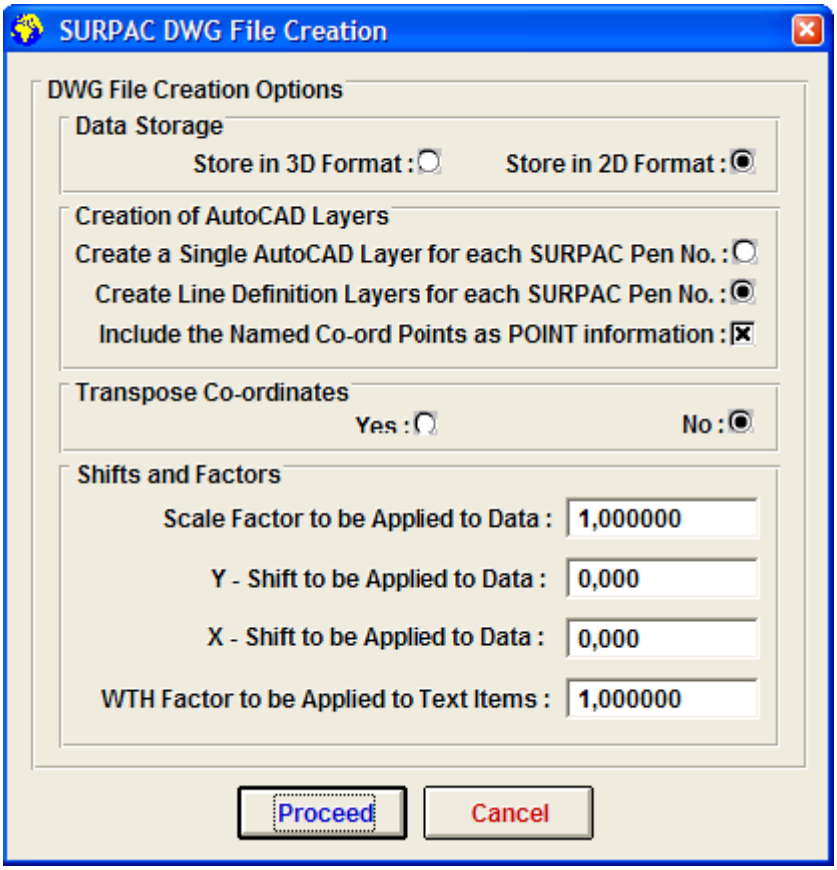
The **Sectional Title** programme was sometimes displaying the incorrect **Area** when using the [**F11**] (Calculate and display the figural Directions, Distances, and Area) function. This has now been corrected.

The **Mid Wall** position calculation was also leaving small line extensions between the first and last lines created at the mid wall position. This has also been corrected.

SURPAC Programmes Modifications for Version 5.23, Release 06

New Layer Options when creating AutoCAD DXF and DWG Files

When creating either **AutoCAD DXF** or **DWG** files, the **SURPAC CAD** programmes (General CAD, General Plan, Diagram, Sectional Title, GP Data Sheet and Working Plan) now include the option of using either a simple Layering system, or a more complex, **Line Colour**, **Type** and **Thickness** based system.


SURPAC DWG File Creation
DWG File Creation Options
Data Storage
Store in 3D Format :
Store in 2D Format :
Creation of AutoCAD Layers
Create a Single AutoCAD Layer for each SURPAC Pen No. :
Create Line Definition Layers for each SURPAC Pen No. :
Include the Named Co-ord Points as POINT information :
Transpose Co-ordinates
Yes :
No :
Shifts and Factors
Scale Factor to be Applied to Data : 1,000000
Y - Shift to be Applied to Data : 0,000
X - Shift to be Applied to Data : 0,000
WTH Factor to be Applied to Text Items : 1,000000
Proceed
Cancel

Simple Layering System (Single AutoCAD Layer for each SURPAC Pen No.)

The first system is the system used in **SURPAC** in the past, and simply assigns all Lines, Arcs, Circles, Text Items for a specified **Pen Number** to a single **AutoCAD** Layer.

If the drawing is complex, and if lines of various thicknesses (or weights) and styles are used on a single Layer, then this method makes it difficult to assign appropriate weights and styles to lines once the data has been transferred to **AutoCAD**. If there are no complex lines per Layer, then this method of Layer generation is acceptable.

Complex Layering System (Line Definition Layers for each SURPAC Pen No.)

This method (which is the default method) is advisable for most drawings being transferred to **AutoCAD**, especially when Lines of various Styles and Thicknesses are used. **SURPAC** will search each Pen Number for Lines of differing Thicknesses and Styles, and allocate a Layer in the **DXF/DWG** file for each combination of Pen No., Style and Thickness used.

For example, if **Pen 01** has one or more Lines having a **Line Thickness 3** (i.e. the thickness is the thickness currently User allocated to Line Thickness 3), and these Lines are defined as having **Line Style 4** (i.e Dash Dot lines), then **SURPAC** will create an **AutoCAD** Layer called

"***P01__DASHDOT__0-75MM***", and all Lines having these attributes will be defined as lying on that Layer.

This makes it a fairly easy task in **AutoCAD** to assign to a Layer the required **Colour**, **Weight** (thickness or width) and **Style**. As all the Lines are set using the BYLAYER option, the transferred lines will automatically take on the assigned colour, weight and style selected for their layer.

Text Items (and **Topo Symbols** in the **General CAD** programme) are also allocated separate Layers from the Lines, Circles and Arcs, for example, "***P01__TEXT_ITEMS***".

Text Fonts used in **SURPAC** are, where possible, matched to equivalent Fonts in **AutoCAD** and are attached to each **Text Item**. Using the **Format Text Style** option in **AutoCAD** then allows the User to easily set appropriate **AutoCAD** Fonts for the Text items imported from **SURPAC** by matching the *Font Name* to the *Style Name* (e.g. matching the *Font Name* ***Arial*** to the *Style Name* ***ARIAL***).

Before formatting these fonts, all **Text Items** will be initially displayed using the STANDARD (MONOTXT) font. Note that whilst this default font allows for rapid zooming and panning in **AutoCAD**, it does not display the imported **Text Items** with their correct shape or spacing, and the **Format Text Style** needs to be used in order to display the **Text Items** correctly.

The "Point Circles" Layer(s)

The **Point Circles** and **Names** of User **Named Points** are put on the Layer called "Point_Circles". This allows for the display of the Point Circles (and the Point Names) to be switched on or off in **AutoCAD**.

For the **Working Plan** CAD programme, there are three Layers used for **Point Circles**. These are "P01__Point_Circles", "P02__Point_Circles" and "P04__Point_Circles". These three Layers cater for the three different Pens that are used for Point Circling in the Working Plan.

The Optional Inclusion of the "Co-ordinated Points" Layer

When creating a **DXF** or **DWG** file, you can now specify whether or not the **Co-ordinate Point** values of the User **Named Points** are to be included as POINT information in the **AutoCAD** Layer called "Named_Co-ord_Points".

General modifications made to SURPAC Software

Using complex Path names for Importing or Exporting DWG files : All CAD Programmes

When using a Path name for the Import or Export of a DWG file that was too complex, the programme would respond with an "Error 53" message, indicating that the file location could not be found. This problem has now been corrected.

Setting the Scale Factor when Importing DXF and DWG files : All CAD Programmes

When Importing either a **DXF** or a **DWG** file into **SURPAC**, the User can specify a **Scale Factor** that is to be applied to the incoming data. This is done by specifying a value for the "**A =**" parameter on the file import form that will be displayed. By default, this value is 1.000000. However, if the incoming data is known to be in millimetres for example, then a scale factor of 0.001 may be applied to convert the incoming data to metres.

With the previous versions of **SURPAC**, the "**A =**" parameter was being re-set back to 1.000000 if the decimal separator was specified as being a "comma"! I know this sounds a bit weird, and it took a while to locate the bug, but it has now been given the "Doom" treatment.

Merging data from a SURPAC Co-ordinate File in another Folder : Co-ordinate File Editing

When the required source Co-ordinate File was located in another Folder, the programme would merge the requested data, but would then open a Co-ordinate File having the same name as the current file, but in the Folder of the source file, and then use this file as the current Co-ordinate File. This problem has now been corrected.

The [**Cancel**] button on the **Merge Options** form was “dead”, and has now been activated.

Co-ordinate File Listing Options : Co-ordinate File Listing

When printing the current **Co-ordinate File**, the “Set Y Co-ordinate Limits”, “Set x Co-ordinate Limits” and “Set Point Name Limits” options were not working. This has now been corrected.

General Plan CAD programme Export to DXF and DWG Files

The point symbols for Reference Marks, Town Survey Marks and Trig. Beacons have been modified to show the correct symbols.

SURPAC Programmes Modifications for Version 5.24, Release 01

Using the Mouse Middle Button [MB] for Scrolling and Scaling

SURPAC now makes full use of the Mouse scrolling function. Most modern rodents incorporate a combined scrolling wheel plus middle button feature. The ideal type of Mouse for use with **SURPAC** is a 3 button Mouse, with the Middle Button being a combination Scroll Wheel/Button. For best usage, the wheel motion action should be "stepped", rather than smooth and should not be too sensitive. This is because **SURPAC CAD** programmes use the Mouse middle button [**MB**] as a "*repeat the last command*" function, so you want to avoid the scroll wheel moving up or down when you are using it as a [**MB**]. An ideal example of good Mouse for use with **SURPAC** is the ***Microsoft*** Optical (wireless) Mouse.

Using the Mouse Scrolling feature for SURPAC non-Graphic programmes

For most non-graphic programmes, moving the mouse cursor into the region occupied by a listing (co-ordinates, observations, point names etc.) will enable the mouse's scroll facility for that listing. This is assuming that there are more items in the list, or grid, than can be displayed in the listing at one time.

For example, if you are using the **Co-ordinate File Editing** programme for a file having a large amount of Points, then by moving the mouse cursor into the co-ordinate Point display area, the Mouse scrolling feature will become active for the listing. You can now move up or down through the listing by scrolling the Mouse wheel. If you want to edit a line of Point information, then Click the required line at the require column position (Name, Y Co-ordinate etc.) and the Mouse cursor will jump onto the **Edit Line** Check Box. The data for the Clicked line will be placed in the **Edit Line** text boxes, and the column Clicked will be highlighted, ready for editing. Once editing is complete, Click the Check Box.

Some **Name Display Grids**, such as for the **Join** and **Polar** programmes, require that the Horizontal Scrollbar is Clicked before the scrolling function becomes active. This is due to the cursor focus being set on one of the **Text Input** boxes (waiting for an input such as a Point name), rather than on the Display Grid.

Using the Mouse Scrolling feature for SURPAC Graphic (CAD) programmes

When in a **CAD** programme, the Mouse scrolling feature can be used as a **Zoom** function allowing you to change the **Display Scale** of the sheet. To **Zoom In**, scroll the wheel away from you and to **Zoom Out** scroll the wheel towards you. The smoothness of the zooming feature depends largely on the amount of data on the sheet and the operating speed of your computer.

A General Summary of Mouse features for SURPAC Graphic (CAD) programmes

The following is a re-cap of the available Mouse functions for **SURPAC CAD** programmes :-

1. ***Holding the [LHB] down and moving the cursor*** – will allow you to **Pan** (move the screen display to another portion of the sheet). You can also **Pan** by sliding the Vertical and Horizontal Scroll Bars.

2. ***Holding the [RHB] down and moving the cursor to the Right*** – will allow you to define a rectangle on the screen, highlighted in magenta. When the Mouse button is released, the sheet display will Zoom In and display the defined area at an enlarged scale.

3. ***Holding the [RHB] down and moving the cursor to the Left*** – moving the cursor a small amount to the left will force the programme to reset the sheet **Scale** and **Position** last used before the previous change of scale. This function may be repeated to recall up to any of 9 previous Scale/Position settings.

4. Zooming by using the Mouse Scroll Wheel – to **Zoom In**, scroll the wheel away from you and to **Zoom Out** scroll the wheel towards you.

5. Clicking the Mouse [LHB] – this is the same as pressing the keyboard [**S**] key (Start Command) or the [**Enter**] key.

6. Clicking the Mouse [RHB] – this is the same as pressing the keyboard [**E**] key (End Command)

7. Clicking the Mouse [MB] – this is used mainly as the "*repeat the last command*" function. For example, if your are modifying triangles in the **Contour CAD** programme, move the cursor close to the required triangle line and then press the [**F11**] key for the first triangle modification. For the next triangle, again move close to the required line and then press the Mouse [**MB**] to repeat the function, and so on. The [**MB**] also has other functions, such as indicating a mid-curve point when drawing an arc.

Layer Modifications for AutoCAD DXF and DWG Files

The method of **Layer** generation for both the **AutoCAD DXF** and **DWG** files from the **SURPAC CAD** programmes has been modified.

As before, **Text Fonts** used in **SURPAC** are, where possible, matched to the equivalent fonts in **AutoCAD** and are attached to each **Text Item**. However, it is no longer necessary to manually map the Font Style Names within **AutoCAD**, as this is now done automatically for most fonts. This applies to the following families of fonts supported by **SURPAC** and **AutoCAD** :-

Arial
Bank Gothic
Bertram
Commercial
Courier New
Dutch
Monospace
Roman
Stylus
Swiss
Times Roman
Universal Maths
Vinetia

The **DXF/DWG STANDARD** font is now set as the being the same as the default font used for the current **SURPAC CAD** sheet. If you want the **DXF/DWG** file set so that it has its **STANDARD** font as the **AutoCAD** default font called **MONOTXT**, then you must set the **SURPAC CAD** sheet so that its default font is also **MONTXT**. This should be done before Text items are generated on the sheet.

Note : Using **AutoCAD's Format Text Style** to set the default font to **MONOTXT** for data that has been generated in **SURPAC** using a True Type font will allow for more rapid zooming and panning in **AutoCAD**, but it will not display the imported **Text Items** with their correct shape or spacing.

The "Point Circles" and "Point Names" Layer(s)

The **Point Circles** and **Point Names** of all points lying on the current sheet are placed in the Layers called "Point_Circles" and "Point_Names", respectively. This allows for the display of the Point Circles and/or the Point Names to be switched on or off in **AutoCAD**.

For the **Working Plan CAD** programme, there are three Layers used for **Point Circles** and three Layers used for the **Point Names**. These are called "P01__Point_Circles",

"P02__Point_Circles" and "P04__Point_Circles" for the circles, and "P01__Point_Names", "P02__Point_Names" and "P04__Point_Names" for the names. These six Layers cater for the three different Pens that are used for Point Circling and Point Naming in the **Working Plan CAD**.

The optional "Co-ord Points" Layer

When creating a **DXF** or **DWG** file, Users can now specify whether or not all the **Co-ordinate Point** values of the **Points** lying on the current sheet (where applicable) are to be included as **POINT** information in the **AutoCAD** Layer called "Co-ord_Points". These Points are sent with the "+" (cross) as the standard symbol. Symbols may then be changed, or turned off, within **AutoCAD**.

Support for New Zealand Grid Systems

SURPAC now provides support for the following **New Zealand** Systems **:-**

1. The New Zealand Geodetic Datum 1949 (NZGD49)

This **Co-ordinate Reference System** is defined by the following parameters :-

- **Ellipsoid : International (Hayford) 1924**
  : a = 6 378 388.000 m
  : b = 6 356 911.946 m
- **True Origin : Latitude 41°00' 00" S**
  : Longitude 173°00' 00" E
- **Origin Shifts : False Eastings = 2 510 000m E**
  : False Northings = 6 023 150m N
- **Scale Factor : 1.000000**
- **Projection : Non-standard (complex)**
- **Unit : International metre**
- **Ordinates : Eastings, Northings (E, N)**
- **Heighting : MSL Orthometric Heights**

2. The New Zealand Geodetic Datum 2000 (NZGD2000)

This **Co-ordinate Reference System** is defined by the following parameters :-

- **Ellipsoid : GRS80 (WGS 1984)**
  : a = 6 378 137.000 m
  : b = 6 356 752.314 m
- **True Origin : Latitude 0°00' 00"**
  : Longitude 173°00' 00" E
- **Origin Shifts : False Eastings = 1 600 000m E**
  : False Northings = 10 000 000m N
- **Scale Factor : 0.999600**
- **Projection : Transverse Mercator**
- **Unit : International metre**
- **Ordinates : Eastings, Northings (E, N)**
- **Heighting : MSL Orthometric Heights**

3. <u>The Mount Eden – Circuit 1949</u>

This **Co-ordinate Reference System** is defined by the following parameters :-

- **Ellipsoid : International (Hayford) 1924**
  : a = 6 378 388.000 m
  : b = 6 356 911.946 m
- **True Origin : Latitude 36°52’ 47.5150” S**
  : Longitude 174°45’ 51.6217” E
- **Origin Shifts : False Eastings = 300 000m E**
  : False Northings = 700 000m N
- **Scale Factor : 0.999900**
- **Projection : Transverse Mercator**
- **Unit : International metre**
- **Ordinates : Eastings, Northings (E, N)**
- **Heighting : MSL Orthometric Heights**

4. <u>The Mount Eden – Circuit 2000</u>

This **Co-ordinate Reference System** is defined by the following parameters :-

- **Ellipsoid : GRS80 (WGS 1984)**
  : a = 6 378 137.000 m
  : b = 6 356 752.314 m
- **True Origin : Latitude 36°52’ 47.0000” S**
  : Longitude 174°45’ 51.0000” E
- **Origin Shifts : False Eastings = 400 000m E**
  : False Northings = 800 000m N
- **Scale Factor : 0.999900**
- **Projection : Transverse Mercator**
- **Unit : International metre**
- **Ordinates : Eastings, Northings (E, N)**
- **Heighting : MSL Orthometric Heights**

When defining a **Co-ordinate File** as being in any one of the above Systems, the **Conversions** menu listing will be modified to display the menu option entitled “**New Zealand System to System Conversions**”. This programme can be used to carry out conversions, such as :-

1. **Mount Eden Circuit 1949 ↔ Mount Eden Circuit 2000**
2. **Mount Eden Circuit 1949 ↔ New Zealand Geodetic Datum 1949**
3. **Mount Eden Circuit 2000 ↔ New Zealand Geodetic Datum 2000**
4. **Mount Eden Circuit 1949 ↔ [Latitude, Longitude] (Hayford Ellipsoid)**
5. **Mount Eden Circuit 2000 ↔ [Latitude, Longitude] (WGS 1984 Ellipsoid)**
6. **New Zealand Geodetic Datum 1949 ↔ [Latitude, Longitude] (Hayford Ellipsoid)**
7. **New Zealand Geodetic Datum 2000 ↔ [Latitude, Longitude] (WGS 1984 Ellipsoid)**
8. **[Latitude, Longitude] (Hayford) ↔ [Latitude, Longitude] (WGS 1984 Ellipsoid)**

General modifications made to SURPAC Software

1. The **Multi-Polar** facility has been improved. When carrying out a Multi-Polar fix, the programme will now display previous sets of values for the Point being fixed if the differences exceed the User defined Multi-Polar limit (this limit can be set by Clicking the "**File options**" button, whilst in the "**Co-ordinate File Editing**" programme). Viewing the previous values enables you to identify which is in error. You can then either re-do the current polar, or use the "**Edit a Multi-Polar/Peg**" programme to investigate any erroneous values.

2. The "**3 Point Circle Fit**" function ahs been added to the **General CAD** programme. This function can be found under the "**Draw**" main menu heading. By Clicking on any three, non-collinear, Points the function will construct a circle through the three defined Points, using the currently defined Pen.

3. The "**Calc. Mid-Wall Positions**" function ahs been added to the **General CAD** programme. This function will generate lines at the centre of wall positions, from existing outer or inner lines and a defined wall thickness.

4. The "**Line Intersect**" functions have been added to the **Working Plan CAD** programme.

5. For all **CAD** programmes, the function for plotting **Graphic Images** has been improved. When sending images to a plotter, the plotting device interprets the position and scale of the image differently to that on the screen. This often results in the plotted images being shown at incorrect positions and scales. The new method employed has been optimised for **HP** Inkjet plotters/printers and plotted images should now show good position and scale relative to their screen views. If small adjustments are still required for individual plotters, then these can be made through options provided on the form displayed immediately prior to sending the data to the printer/plotter.

6. The **System Set** form for **Co-ordinate Files** now includes two **Information** Text Boxes, allowing Users to enter any descriptive notes relevant to the current file. These information lines are not printer or displayed anywhere, except in the **System Set** form itself, and are there purely as reminders, or information, for the User.

7. The problem experienced by some Users when switching between the **Join**, **Polar** and **Intersection** programmes has been fixed up. It is also useful to note that **SURPAC** uses the Special Function Keys ([**F2**], [**F3**] etc.) as "hot" keys, allowing you to quickly toggle between some of the more widely used programmes. In summary, these are :-

   [**F1**] – Reserved for calling the **SURPAC Help Pages** for the currently displayed programme.
   [**F2**] – The **Co-ordinate File Editing** programme.
   [**F3**] – The **General CAD** programme.
   [**F4**] – The **Observation File Editing** programme.
   [**F5**] – The **Tacheometric File Editing** programme.
   [**F6**] – The **Contour CAD** programme.
   [**F7**] – The **Polar** programme.
   [**F8**] – The **Join** programme.
   [**F9**] – The **Intersection** programme.
   [**F10**] – Not used - Reserved by ***Windows***.
   [**F11**] – The **Areas from Co-ordinates** programme.
   [**F12**] – The **Areas from Co-ordinates** (**with Co-ord Checking**) programme.

   The above settings do not apply when using any of the **CAD** programmes, as these programmes have their own usage for the Special Function Keys.

   The above settings are the default settings, and can be changed to individual requirements by using the "**Set the Function Key Allocations**" function, found under the "**File**" main menu heading.

8. The problem that sometime occurred with the [**U**] Command (Write Line Distance) in the **General Plan CAD** programme has been fixed up. This problem could occur when a single long line had been broken into a series of smaller, connected lines and then had some of these smaller lines deleted, leaving a line – blank – line blank effect.

9. Users will notice that **SURPAC** has now been given more of a ***Windows XP*** look. All **Buttons** and **Scroll Bars** have been changed to follow the ***Windows XP*** standard appearance. **SURPAC** also has three standard **Colour Schemes** to automatically match either the ***Windows XP*** Blue (default), Olive Green or Silver colour schemes. Although these colour schemes have been designed to closely match the ***Windows XP*** colours, Users can modify these schemes by using the "**Set the Screen Display Colours**" function, found under the "**File**" main menu heading.

SURPAC Programmes Modifications for Version 5.24, Release 02

New Minimum Screen Resolution for SURPAC Software

Please note that the minimum screen (desktop) resolution for the correct viewing of **SURPAC** forms and menus is now **1024** x **768** pixels. If you are still operating a PC or Laptop at the old 800 x 600 pixel resolution, you will need to change this to **1024** x **768**. Running **SURPAC** on a PC or Laptop with the screen set lower than the **1024** x **768** pixel resolution will cause forms to be partially hidden and menus to be truncated.

To reset the screen resolution, do the following :-

Click the Mouse **[RHB]** anywhere on the desktop display,

1. On the displayed menu, select (Click) the ***Properties*** item,

2. On the displayed form, Click the ***Settings*** tab,
3. Set the *Screen Resolution* to **1024** x **768** (or higher, if you want).
4. Reset the *Color Quality* to **Medium** (**16 bit**). (This is because ***Windows XP*** has the nasty habit of unilaterally setting the *Color Quality* to High (32 bit), whenever you change the screen resolution).
5.

New SURPAC Menu Structure and Display Options

SURPAC has a new Menu structure to make it more visually compatible with **Windows XP** and applications such as **Office 2003**.

On running **SURPAC**, you will notice that the software menus defaults to the "**Office 2003**" look. Apart from the normal main Menu Heading at the top of the display, a new main Menu fixed **Toolbar** is now also displayed. The main **Toolbar** provides rapid access to a number of the more common programmes within **SURPAC**.

Users may now choose from four different Menu display styles. To view these styles, Click the ***File*** item found on the main Menu Heading. From the displayed menu, move the Cursor onto the menu item ***Set the SURPAC Menu Style***. A sub-Menu will be displayed, showing the four different styles available, which are :-

Style 1 – Office 2000 : This is the Menu style that **SURPAC** has used up to now. A bit dull, has no 3D feature and selection, and the "hover" highlighting is weak.

Style 2 – Office XP : An improvement on Office 2000 above. Still no 3D feature, but a nice highlighting feature with shadows.

Style 3 – Office 2003 : In my opinion, the best of the four styles. It uses a colour scheme to match that selected by the User for the ***Windows XP*** display, It displays the Toolbars in 3D and uses a good contrast colour to clearly show highlights. This is the default style for **SURPAC**.

Style 4 – VS 2005 : Also an attractive style, using a colour matching the form background colour. It also displays the Toolbars in 3D and uses a good contrast colour to clearly show highlights.

The new main **Toolbar** contains various programme icons. To view an icon's programme function, let the Mouse cursor hover over the icon. Once your "mind's eye" has made the association between the icons and the programmes, you will find that using the **Toolbar** is a quick and convenient way of navigating around the most commonly used programmes in **SURPAC**.

With the addition of the main **Toolbar**, Users now have three methods for accessing the more common programmes in **SURPAC**.

1. By selecting the required programme from the "drop down" Menus which are displayed by Clicking on any of the main Menu Headings. (For all programmes)
2. By Clicking the appropriate icon on the main Toolbar. (For selected programmes)
3. By using the appropriate Special Function Key on the keyboard (refer to the write up for Version 5.24, Release 01). (For selected programmes)

All **SURPAC CAD** programmes have had their **Toolbars** moved from the right hand side of the screen to the top of the screen, immediately below the programme's menu heading bar. These **Toolbars** are fixed, but can be removed (hidden) by the User, if required, once the programme is running.

All **SURPAC CAD** programmes now have built in **Help** menus. The **Help** topics basically follow the programme's Menu headings. To view a Help topic, Click the Menu Heading ***Help*** (which is always the last Menu heading) and then select the required topic from the displayed menu.

Each topic displayed will cover the available Commands, or functions, for that topic. The [F1] key is still applicable for the overall Help pages

New features for the General Plan & Sectional Title CAD Programmes

Sheet Protection : The data for a General Plan, or Sectional Title Sheet may now be protected to prevent any unauthorized data changes. For example, once a **GP** Sheet has been finalized pending Data and Consistency checks, the Sheet can be protected (locked) whilst these checks are being carried out. The Sheet Protection menu item can be found under the programme's ***Edit*** menu heading. Protecting a Sheet requires the entry, and check entry, of a password. Unprotecting (unlocking) the Sheet can only be done by entering the same password – so be careful! If a Sheet does get locked and the password forgotten or misplaced, you can send the GP Sheet data files through to me and I will be able to unlock the Sheet. *Thanks to Hennie Maartens of Kempton Park for the original idea.*

[LP] – Line Perpendicular : This Command allows for the construction of a new **Line**, starting at a defined **Point** (or Line terminal) and intersecting a defined existing **Line** at the perpendicular.

First the **[LP]** Command must be given. It is not important where the Cursor is at this stage. The Cursor should then be positioned near to the **Point**, or **Line** terminal, from which the new **Line** is to be drawn and the Mouse **[LHB]** clicked. Next, move the Cursor close to any position of the **Line** to which the perpendicular Line is to be drawn, and again click the Mouse **[LHB]**.

If the new **Line** meets the existing **Line** at a position outside the limits of the existing **Line**, then the existing **Line** will automatically be extended to this new junction position. *Thanks to Hendrik Kroep of Potchefstroom for the original idea.*

Point Circle Sizes : The **Circle Size** to be used for **Naming** Points on a **GP** or **ST** can now be User selected. The default size (diameter) for **Point Circles** is 2.5mm, but Users can now select any required **Circle Size** from 1.0mm up to 5.0mm. Once a **Circle Size** has been set, this size will be used for any future **Points Named**, until the size is again reset by the User. The **Text** character size for Point **Name** will be the same as the **Point Circle** size used.

To set the **Circle Size**, Click the heading ***Name Posn*** on the programme's Menu bar, then select the menu item ***Change Circle Size***. *Thanks to Mike Cokwana of KW Town for the original idea.*

New feature for the Diagram CAD Programme

Sheet Protection : As for the General Plan programme, a Diagram's data may now be protected to prevent any unauthorized data changes. The Sheet Protection menu item can be found under the programme's ***Edit*** menu heading. Protecting a Diagram requires the entry, and check entry, of a password. Unprotecting (unlocking) the Diagram can only be done by entering the same password. If a Diagram does get locked and the password forgotten or misplaced, you can send the Diagram data files through to me and I will be able to unlock it for you.

New features for the General CAD Programme

[LP] – Line Perpendicular : This Command allows for the construction of a new **Line**, starting at a defined **Point** (or Line terminal) and intersecting a defined existing **Line** at the perpendicular.

First the **[LP]** Command must be given. It is not important where the Cursor is at this stage. The Cursor should then be positioned near to the **Point**, or **Line** terminal, from which the new **Line** is to be drawn and the Mouse [LHB] clicked. Next, move the Cursor close to any position of the **Line** to which the perpendicular Line is to be drawn, and again click the Mouse [**LHB**].

If the new **Line** meets the existing **Line** at a position outside the limits of the existing **Line**, then the existing **Line** will automatically be extended to this new junction position.

Improvement to the "UnDo" function - all CAD Programmes

The "**UnDo**" function used by all the **SURPAC CAD** programmes has been improved. Basically, this function allows you to "**UnDo**" up to 9 of the last changes made to the current **CAD** sheet, as long as these changes were made during the current session. A change can be anything from, for example, a simple Text item edit, or up to a complete import of data from another sheet or DXF file. Whilst this function has been performing correctly, it did cause a slow down in programme speed on large **CAD** sheets. The larger the amount of data on the sheet, the more noticeable was the slowdown. The new method of retrieving and storing a **CAD** sheet's data for the purpose of the "**UnDo**" function has now been changed, and this slowdown effect has been eliminated.

General modifications made to SURPAC Software

Using [N, E] Co-ordinate Values : Historically, **SURPAC** have been able to define Co-ordinate Files as being either [Y, X] system files, or [E, N] system files. This choice has been extended with the addition of the [N, E] system. This has been added mainly so as to comply with Co-ordinate File layouts as used in New Zealand.

Point Comparison using Different Files – This programme will now compare **Height** values in the two files, if the Point **Height** element (column) has been set to be visible. To set this value as visible, Click the ***File*** main Menu heading and then select the ***Set the Co-ordinate File Elements*** menu item. If the Height value is not made visible, this programme will only compare the [Y, X] (or [E, N] or [N, E]) values. *Thanks to Jarek Siwinski of Johannesburg for the original idea*

Quick Access to Point Delete and Point Copy – This new function applies to the **Co-ordinate File Editing**, **Observation File Editing** and **Tacheometric File Editing** programmes. When a file Point (or Line) is Clicked, there is normally 1 of 3 actions that can take place, namely **Editing**, **Deleting** or **Copying**. When a Point is Clicked, the Cursor jumps to the Checkbox at the end of the **Edit** line, assuming that **Editing** will take place. However, if **Editing** is not required, you can now Click the Mouse [**RHB**] (whilst the cursor is in the Checkbox), and a small pop-up menu will appear, allowing you to select either of the **Delete** or **Copy** functions.

Co-ordinate File Listing – Previously, this programme was not correctly transferring the listed data to an ***Excel*** file, if the file was in the **Cadastral** Mode. This has now been fixed up.

SURPAC Programmes Modifications for Version 5.24, Release 03

General Modifications to SURPAC Software

There are no major changes in this upgrade, just some minor modifications and corrections for a few "bugs" found floating around after the last upgrade, which are :-

SURPAC Problem when using both local drives "C:" and "D:"

SURPAC was displaying a message stating that "*There are too many **SURPAC** Installations on this Network*" when Windows was installed on Drive "D:" and **SURPAC** was installed on Drive "C:", or vice versa. This has now been rectified.

SURPAC Problem when closing down

When **SURPAC** was closed down by means of clicking the red [**X**] button at the top right of the form, instead of using the normal "***Exit SURPAC Software***" menu item, the application was not closing down correctly if the "***Current File Printer Pages***" form was displayed. This has now been corrected.

The General Plan CAD programme

The [**F11**] function (***Auto Write Stand Data & Area***) was not closing the defined Erf/Stand correctly. Also the **Ctrl-A** function (Calculate the Area from a Stand/Erf defined by Point identification) was not working correctly. These have now been rectified.

The General CAD and General Plan CAD programmes

For both of these programmes, an extra menu heading has been added entitled ***Delete (Rub)***. These menus consist of all the **Delete**, or **Rub**, options available for the programme.

The General CAD programme – File sharing over a LAN

Previously, this programme allowed for the **CAD** Sheet to be stored in a different Path/Folder than its associated Co-ordinate File. This, however, caused problems in a **LAN** when two or more work stations accessed the same **CAD** Sheet. To overcome this problem, a **CAD** Sheet is now automatically stored in the same Path/Folder as its associated Co-ordinate file.

Note, that due to the temporary **CAD** Sheet file storage required for the **SURPAC** "**UnDo**" functions, a **CAD** Sheet from any of **SURPAC**'s **CAD** programmes may not be used on more than one work station at a time. A "*Permission Denied"* error is displayed if this attempted.

The General CAD programme – Setting Mark Points

Previously, in order to set a **Mark Point** at a position on the **CAD** Sheet, the User would need to first Click the required **Mark point** icon on the upper menu toolbar, then click the ***Set current Mark Point at Cursor*** icon on the lower menu toolbar, move the cursor close to the required Point and then Click the mouse [MB] (or press the keyboard [~] key.

This routine has been simplified and now Users just need to first Click the required **Mark point** icon on the upper menu toolbar, then move the cursor close to the required Point and Click the mouse [MB].

After doing the above, to set the same **Mark Point** at further Points simply move the cursor close to a required Point and then Click the mouse [MB].

The Diagram CAD programme – Servitude Data

When displaying User defined **Servitude** data, the programme was leaving out the co-ordinates of the last Point in then **Servitude**. This has now been corrected.

All SURPAC CAD programmes

The use of the **Up**, **Down**, **Left** and **Right** keyboard arrow keys has been re-instated. Pressing any of these keys move the cursor in the appropriate direction. The amount of movement made per key stroke, in mms, is set by using the ***Set Arrow Key Movements*** menu item, found under the ***Edit*** menu heading.

Using the Joins, Polars and the Road Apex programmes

Switching between this group of programmes could sometimes cause **SURPAC** to "lock up", requiring an "Alt+Ctrl+Del" action to close down the application. This has now been rectified.

Merging Co-ordinate File data from another Co-ordinate File

This routine was sometimes leaving out 2 or 3 Points from the defined Source file. This has now been corrected.

The Co-ordinate File, Observation File and Tacheometric Editing programmes

After **Editing** a data Line in these programmes, instead of defaulting to the next Line, the new data Line selected would be offset from the previous position by a few lines. This has now been rectified.

The Co-ordinate File Listing programme

When sending a **SURPAC Co-ordinate File listing** to a ***Microsoft*** **Excel** file, and when the **Co-ordinate File** was set up as being in the **Cadastral Mode**, the resultant **Excel** File had the last 7-8 Points excluded from its listing. This has now been corrected.

The Co-ordinate File Editing programme

When in the **Point Add** mode and entering the **Name** of a **Point** that already exists, the programme now displays a warning before attempting to overwrite the existing **Point**.

Setting the Co-ordinate File System

For projections having multiple belts, such as the "**Lo**", "**WG**" and "**UTM**" projections, a drop down list of the available belts, or systems, is provided. Users can select the required system by Clicking the appropriate value in the list.

Locate and Mean Point Groups in a File programme

This programme has additional options when selecting the **Mean Values** for a **Point Group**. These options are :-

Mean the Y, X and Z values (or N, E and H values),
Mean the Y, X values (or N, E values) only, or
Mean only the non-zero Z (or H) values.

Using these options, various position and/or height means may now be selected for the **Mean Values** of a located **Point Group**.

Extended Control File Data Base for "WG" values.

The **SURPAC Control Files**, used for automatic transformations between "**Lo**" and "**WG**", have been extended by the addition of the "**WG**" values of all **TSM**'s in the **Centurion**/**Midrand** area. Unfortunately, we do not have the "**Lo**" values for this area as yet, so the **TSM**'s cannot be used for any system transformations. However these **TSM** values can be used in the **Locate and Add Nearest Trig./TSM Beacons** programme, when the current Co-ordinate File is defined as being in the South African "**WG**" system.

If there is any User who has the official "**Lo**" values for **TSM**'s in the area, I would be grateful for an **ASCII** or **SURPAC** listing for these Points to add to the **Control Files**.

Also, if there are Users who may have official data for **Trig**. and/or **TSM** data that may be missing from other areas (in "**Lo**" or "**WG**"), these data would also be appreciated in order to make the **Control Files** more complete.

SURPAC Programmes Modifications for Version 5.24, Release 04

New Programme – Circle Centre and Radius determination from Arc Points

This programme will calculate the **Circle Centre** and **Radius** of a circle determined from multiple Points surveyed on the circumference of the circle (Arc Points).

The programme can accommodate up to 200 Arc Points and uses a "best fit" procedure to determine the most likely [**Y**, **X**] (or **E**, **N**]) values of the **Circle Centre** and the **Radius**.

The programme can be located by clicking the ***General*** main menu heading and then selecting the menu item ***Circle Centre from Arc Points***.

Arc Points that are to be used are loaded into the top grid listing by clicking on the their **Names** in the **Name Display Grid** at the bottom of the form. After at least three Arc Points have been defined, the programme will compute and display the [**Y**, **X**] (or **E**, **N**]) values of the **Circle Centre**, plus the circle **Radius**. As more Arc Points are added to the list, these values will be re-computed and the **DY**, **DX** and **DR** values (the **Y**, **X** and **Radius** differences respectively) for each defined Arc Point will also be shown. These differences show the respective shifts at a given Arc Point, from the best fit values.

Any Arc Point may be removed form the displayed Arc Point list by clicking on the Point concerned and then clicking the [**Delete Data**] button in the ***Actions Bar Menu*** on the left of the form.

Once all the required Arc Points have been defined, enter a **Name** and then a **Description** for the newly determined **Circle Centre** point. The calculation can be printed using the [**Print**] button in the ***Actions Bar Menu***.

When the [**OK**] button is clicked, the **Circle Centre** point will be saved in the current Co-ordinate File and **SURPAC** will then exit from the programme.

My thanks to Dudley Pound of Centurion for the original suggestion.

All CAD Programmes – Circle and Arc drawing using Line Styles

The drawing of both **Circles** and **Arcs** in all **SURPAC CAD** programmes has been improved. Any Line **Style**, Line **Thickness** or Pen **Colour** used for drawing straight lines can now be applied to the drawing of both **Circles** and **Arcs**.

All CAD Programmes – Importing/Exporting of TIFF and PNG Images

All **SURPAC CAD** Programmes are now able to both import and export images using the **TIFF** (*Tagged Image Format File*) and the **PNG** (*Portable Network Graphics*) image file formats.

TIFF files have the extension of either **.tif** or **.tiff** and **PNG** files have the extension **.png**.

Although these formats seem to offer no obvious space or image clarity advantages over the **JPEG** (.**jpg**) image file format, many application use these formats (especially the **TIFF** format) and for this reason they have been added to **SURPAC**'s list of supported image formats.

General Plan CAD Programme – [Ctrl]+[C] function Extended

The [**Ctrl**]+[**C**] function (*Data Consistency check using Co-ordinates*) in the **General Plan CAD** programme has been extended to display separate **DY** and **DX** values for :-

1. The accumulated line (side) data, and
2. The current line (side) data.

This makes the identification of any data error somewhat easier and also reduces the possibility of errors being undetected in the case of compensating errors being present in the data.

Due to the additional data columns displayed, the form used for the [**Ctrl**]+[**C**] function is naturally wider and takes up more screen space. To prevent this becoming a problem, ensure that the screen display setting for the PC/Laptop is at least 1024x768 pixels.

My thanks to Hendrik Kroep of Potchefstroom for the original suggestion.

The General CAD Programme – Listing Linked CAD Sheets

It is possible to have a number of **General CAD Sheets** that are associated (linked) to the same Co-ordinate file. By default, **SURPAC** will load the **CAD Sheet** having the same name as the Co-ordinate file when ever the **General CAD** programme is activated. However, a new or a existing **CAD Sheet** can be loaded by the User by clicking the ***File*** menu heading and then selecting the menu item ***Open or Create a CAD Sheet***.

Over time, numerous **CAD Sheets** can exist in a data folder, not all of them having the same name as their associated Co-ordinate File. To solve the problem of having to remember which **CAD Sheets** is linked to which Co-ordinate file, a new feature has been added into the **General CAD** programme which does this for you.

If you want to load a linked **CAD Sheet** into the programme, or just see which **CAD Sheets** are designated as being linked, then click the ***File*** menu heading and then select the menu item ***View/Select Linked CAD Sheets***.

A form will then be displayed showing the list of **CAD Sheets** linked to the current Co-ordinate file. This action could take a few seconds if there is a large number of **CAD Sheets** files in the current data folder.

If you want to **Select** one of the listed **CAD Sheets**, then click the Sheet name to highlight it and then click the [**Select the Highlighted CAD Sheet**] button.

If you want to **Delete** one of the listed **CAD Sheets**, then click the Sheet name to highlight it and then click the [**Delete the Highlighted CAD Sheet**] button.

Note :-
A **CAD Sheet**'s linked, or associated, Co-ordinate File can be changed at any time by clicking on the programme's ***Edit*** menu heading and then selecting the menu item ***Change Associated Co-ordinate File***.

My thanks to André Van Der Walt of Pretoria for the original suggestion.

The Co-ordinate File Listing Programme – Editing the Printer Output

When sending a output of the current Co-ordinate file data to a **Printer**, the **Clipboard**, an **ASCII** file or to an ***Excel*** file, it is now possible to make modifications to the output information before the printing, or file creation, takes place.

There are two ways of calling the Co-ordinate file output routine. Either click the main file heading ***General*** and then select the menu item ***Print the co-ordinate File List*** or, whilst in the **Co-ordinate File Editing** programme, click the [**Print File**] button in the ***Actions Bar Menu***.

After selecting the required Co-ordinate file listing options, the display of the listing will be shown on screen, as it was before. The only obvious difference will be a blue information line at the head of the listing with the caption :-

Click on any data line to enable editing of that line. Press Enter to accept changes. Press Esc to cancel.

You can now click on any displayed line that you want to edit, and the line will be highlighted. Whilst focussed on that line, the cursor will change to the “I Beam” style, indicating that editing can take place. Move the cursor along the line to the beginning of the item that is to be edited and then enter the required changes. Note that the overwrite mode is not available. Changes must be entered and then the non-required portion of the original text deleted.

To **accept** any changes made on that line, press the **Enter** key or double click the mouse LHB.

To cancel any changes made and return to the original text, press the **Esc** key.

The object of this editing function is to provide a facility to making changes to items such as descriptions and heading on the output printout, or output file. These changes only relate to the current output activity and are not permanent changes. Once the listing has been made and the programme exited, these modifications will be lost.

If any inadvertent changes are made, such as to co-ordinate values, then simply Exit from the programme without printing, and then re-generate the output listing in the usual way.

My thanks to Dudley Pound of Centurion for the original suggestion.

General Modifications made to SURPAC Software

SURPAC Problem when closing down

When **SURPAC** was closed down by means of clicking the red [**X**] button at the top right of the form, instead of using the normal ***Exit SURPAC Software*** menu item, the application was not closing down correctly. This was happening when using various programmes in **SURPAC**. The result was a "*Permission Denied*" error if you then re-ran **SURPAC** before closing down the PC.

This problem seems to be fixed now, but if the "*Permission Denied*" error still crops up with any User, please let me know about it.

Note :-

If this error does occur, it is not necessary to re-boot the computer, as some Users have been doing. Simultaneously press the [**Alt**] [**Ctrl**] [**Del**] keys and the **Windows Task Manager** will be displayed. If the Task Manager shows **SURPAC** as still running (after you have closed it down) then highlight it in the Task Manager list and then click the [End Task] button.

Locate and Mean point Groups in a File

This programme has been modified to handle large files, in the order of 10,000 points. The previous version was giving an "out of subscript" error on these large files, and was very slow during the Point Deletion and Point Modification processes.

General CAD programme – [A] and [Ctrl]+[A] Commands

These two commands (Figural Area from lines and Figural Area from Point definition) were causing problems in certain instances. These problems have now been fixed.

Co-ordinate File Editing programme

If you click anywhere on the file heading display (**Name Y Co-ordinate X Co-ordinate** etc.), the "**Set Co-ordinate File Elements**" form will be displayed. On this form you can reset the co-ordinate elements, Description, Calc Page and/or F/B Page that are to be shown for the current file.

If you click anywhere on the top row of the displayed file information grid (**Constants** etc.), the entire co-ordinate file will be highlighted. You are then able to Delete or Copy the entire file, but use this facility with care! Once the entire contents of a file have been deleted, they cannot be retrieved.

Extended Control File Data Base for "WG" values

The **SURPAC Control Files** (used for automatic transformations between "**Lo**" and "**WG**") have been extended by the addition of the "**WG**" values of all **TSM**'s in the **Ladismith**, **George**, **Mosselbaai** and **Senekal** areas, plus the "**Lo**" values for **Senekal**. For **Ladismith**, **George**, **Mosselbaai** areas these **TSM**'s cannot be used for system transformations, due to lack of the "**Lo**" values, but they can be used in the "**Locate and Add Nearest Trig./TSM Beacons**" programme, when the current Co-ordinate file is defined as being in the South African "**WG**" system.
Thanks to Willem Knoetze of Sedgefield and Michael Van Niekerk of Welkom for the above data.

SURPAC Programmes Modifications for Version 5.24, Release 05

All CAD Programmes – Importing/Exporting Images using TIFF World Files

All **SURPAC CAD** programmes now have the ability to both **Import** and **Export** graphic images using parameters from associated **TIFF World Files** (***.TFW**). These small text files are normally attached to **TIF**, or **TIFF**, graphic files and contain parameters which are used to automatically position, rotate and scale the image on the Sheet, or plan, into which it is imported. This saves a lot of User time normally spent on ensuring that an imported graphic image is correctly situated on the sheet, or plan.

Please note that the information stored in a **TFW** file does not constitute complete geographical positioning, and you still need to ensure that the [**Y**, **X**] (or [**E**, **N**]) co-ordinates in the **TFW** file relate to the **Projection** and **System** of the current **Co-ordinate File** (**RSA WG 27°**, for example).

The **TFW** file must have the same name as its associated **TIF**, **TIFF** or **JPG** graphic file, in order for this function to operate.

The function is very useful when importing orthometric images, such as rectified orthophotos.

Thanks to Ed Kinsey of Chief Directorate Survey & Mapping, Mowbray, for the sample data files.

All CAD Programmes – Spell Checking Facility

All **SURPAC CAD** programmes now incorporate a **Spell Checking** facility. This facility will check the spelling of individual **Text** items as they are created (using the **[WT] – Write Text** Command), or when they are edited (using the **[WE] – Write Edit** Command).

There is also a new **Menu** item called "**Spelling Check – All Text**", which can be found under the "**Text**" menu heading. Selecting this menu item will cause the programme to carry out a spelling check on all **Text** Items, with the exception of **Directions**, **Distances** and **Point Names** (unless a **Point Name Position** is set as **N5** or **N0** and the **Name** then written as a **Text Item**).

This **Spell Checking** is essentially the one used by the ***Microsoft* Office** (Version **2000**, or later) applications (such as **Word**, **Excel**, **Access** etc.) and in order for the **Spell Checking** facility to be activated in the **SURPAC CAD** programmes, it is necessary that the ***Microsoft* Word** application has been installed on the computer. If ***Microsoft* Word** has not been installed, the **Spell Checking** facility in the **CAD** programmes will be automatically disabled.

Further to the above, ***Microsoft* Word** must be installed in one of the following folders :-

C:\Program Files\Microsoft Office\Office
C:\Program Files\Microsoft Office\Office10
C:\Program Files\Microsoft Office\Office11
C:\Program Files\Microsoft Office\Office12
C:\Microsoft Office\Office
C:\Microsoft Office\Office10
C:\Microsoft Office\Office11
C:\Microsoft Office\Office12

If you have ***Microsoft* Word** installed in any folder other than one of those listed above, then in order to activate the **CAD Spell Checking** facility, create a folder called "**C:\Microsoft Office\Office**" and copy the application file called "**Winword.exe**" into this folder.

As this facility makes use of the ***Microsoft* Office** defined dictionary, any words that are added into its dictionary will also be accepted by the **SURPAC CAD Spell Checking** facility.

By default the **Spell Checking** facility will be set as **Active** (or **Enabled**), unless ***Microsoft* Word** cannot be located. However, if you decide that you do not want the **CAD** programmes to make use of the **Spell Checking** facility, then it can set this function as **Inactive** (or **Disabled**) by going

to the **Co-ordinate File Editing** programme, clicking the [**File options**] button on the **Actions Menu Bar**, and then de-selecting the "**Use Spell Check facility in CAD Programmes**" option in the bottom right hand panel.

General Modifications made to SURPAC Software

General CAD Programme – Line Erasure Polygon (Lines, Arcs and Circles)

This function will now also **Delete** any **Arcs** or **Circles** found within the defined **Polygon**. In order for an **Arc** to be deleted, the entire **Arc** must lie inside the defining **Polygon**.

General CAD Programme – Reset Attributes for Arcs and Circles

This new function allows for the **Resetting** of the **Attributes** for **Arcs** and **Circles**. As for the resetting of **Line** attributes, each **Arc**/**Circle** can be reset individually, or all **Arcs**/**Circles** having the same attributes as the selected all **Arc**/**Circle** can be **Reset** simultaneously, or all **Arcs**/**Circles** having the same attributes as the selected **Arc**/**Circle** can be **Deleted**.

Sectional Title CAD Programme – Importing data from TopoCAD

This function was not importing the data as instructed, but this has now been rectified.

Working Plan CAD Programme – Importing DXF data

This function was not importing the data as instructed, but this has now been rectified.

Creating an ASCII File from a Co-ordinate File

An option has been added which allows the User to suppress the sending of header information to the **ASCII** file. This header information includes a description of the file system, file name, date etc. and would normally be required information when sending the **ASCII** file to a third party. However, these header lines apparently cause a problem for **ASCII** files which are generated for purpose of loading into GPS or Total Station devices. In these cases, these header lines can now be suppressed.

Folders for Observation Files

Up to now, an **Observation** file had to reside in the same folder as the current **Co-ordinate** file. Whilst this would be the normal requirement for the majority of cases, having the **Observation** file in a folder other than that of the Co-ordinate file provides more flexibility. As from this release, you can open or create an **Observation** file in any folder.

Data Traverse – Calculation Page Numbering Problem

The **Data Traverse** programme was not generating the correct **Calculation Page Numbers**. The **Page Numbers** were either omitted altogether, or an incorrect number was assigned. This has now been rectified.

Locate and Mean Point Groups in a File

This programme has been extended to allow for the display of all Points in the current **Co-ordinate** file which do not form a part of any **Point Group**. A **Point Group** is simply a group of two or more Points that lie within a User defined search radius of a Primary Point. The Primary Point is normally the first Point located for a group.

This useful addition now makes it possible to display all placed Points which, for example, are either unchecked, or for which the **check** Point lies outside the User defined search radius. This list of Points can be sent to the **Printer**, an **ASCII** file, the **Clipboard** or to an **Excel** file. By saving the list as an **Excel CSV** file, the information can quickly be imported into a GPS or Total Station device.

When running this programme, the last two options shown at the bottom of the form allow for either a normal output of the results of the **Point Group** search, or an output of all Points not forming a part of any **Point Group**.

Thanks to Michael van Niekerk of Welkom for the original suggestion

Converting (Merging) Data from a Tacheometric File into a Co-ordinate File

This function now offers the option of merging data of specific **Description**(**s**). When calling this function, a listing of all **Descriptions** used in the defined **Tacheometric** file will be shown (including a blank description). You may then select all **Descriptions**, if you want to merge the entire file, or just select (highlight) the required **Description**(**s**). On **Merging**, only those Points having one of the selected **Description**(**s**) will be merged into the Co-ordinate file.

Thanks to Michael van Niekerk of Welkom for the original suggestion

Co-ordinate File Editing – Point Description Problem

When editing Point data in this programme a problem occurred in the following situation :-

If a **Point Description** existed for a Point, but the **Descriptions** column was not currently displayed then, if any item on that Point's data line was edited the Point **Description** would be deleted. This has now been rectified.

All CAD Programmes – Plotting of Arcs

Arcs on a drawing were sometimes displaced when the drawing was sent to the Plotter. This depended on the defined Plotting Scale set for the drawing and the actual Plotting Scale as used. This problem has now been rectified.

SURPAC Programmes Modifications for Version 5.24, Release 06

All CAD Programmes – New Spell Checking Option

The **Spell Checking** facility introduced with the previous **SURPAC** Upgrade, has had an option added which allows the function to be turned **On** or **Off** when using either the **[WT] – Write Text** Command, or the **[WE] – Write Edit** Command. This option does not affect the usage of the "**Spelling Check – All Text**" Command.

When selecting either the [**WT**] or the [**WE**] Command you will see that a new check item at the bottom of the displayed form entitled ***Use Spell Checking function***. De-selecting this item will de-activate the **Spell Checking** for Text items that are either Written or Edited.

NB : By default the **Spell Checking** facility will be set as **Active** (or **Enabled**), unless ***Microsoft* Word** cannot be located. However, if you decide that you do not want the **CAD** programmes to make use of the **Spell Checking** facility, then you can set this function as **Inactive** (or **Disabled**) by going to the **Co-ordinate File Editing** programme, clicking the [**File options**] button on the **Actions Menu Bar**, and then de-selecting the "**Use Spell Check facility in CAD Programmes**" option in the bottom right hand panel.

General CAD Programme – New Functions

Some new features have been added to the **General CAD Programme**, viz

Line - Arc Junction : This Command has three variations, namely **Trim Line Only**, **Trim Arc Only** and **Trim Line and Arc**. They are used to identify and/or trim either the **Line** or the **Arc** for an existing **Line**-**Arc** intersection.

The Commands provides for three different **Line** – **Arc** Junction (Intersection) calculations. The intersecting **Line**, or **Arc**, or **both**, may be trimmed to the junction point.

These Commands may be activated from the Menu system by Clicking the "**Draw**" main menu heading, selecting the "**Line** – **Arc Junctions**" item, and then selecting the required sub-menu item.

Alternatively the Commands may be activated by using a three Key keyboard Command, with the following Options :-

Trim Intersecting Line [LJL]
After giving this Command, Click close to the intersecting **Line**, in the vicinity of the **Arc**. Then Click close to the intersecting **Arc**. The programme will trim the identified **Line** at the **Line-Arc** junction (intersection) position..

Trim Intersecting Arc [LJA]
After giving this Command, Click close to the intersecting **Line**, in the vicinity of the **Arc**. Then Click close to the intersecting **Arc**. The **Arc** point selected will indicate which side of the **Arc** is to be trimmed. The programme will trim the identified portion of the **Arc** at the **Line-Arc** junction (intersection) position.

Trim both Intersecting Line and Arc [LJB]
After giving this Command, Click close to the intersecting **Line**, in the vicinity of the **Arc**. Then Click close to the intersecting **Arc**. The **Arc** point selected will indicate which side of the **Arc** is to be trimmed. The programme will trim both the **Line** and the identified portion of the **Arc**, at the **Line**-**Arc** junction (intersection) position.

Line at Half Angle of Pair [LH] : This new Command allows the user to create a new **Line** being a **Line** representing the mean **Line** position between a defined pair of **Lines**. If the two

defined **Lines** are not parallel, the new **Line** will be drawn at the half angle (mean direction) of the two **Lines**.

This Command may be activated by Clicking the "**Draw**" main menu heading and then selecting the "**Line at Half Angle of Pair**" item, or by entering the [**LH**] keyboard Command. Once the two required Lines have been defined, the new **Line** will be drawn using the current Line Colour, Style and Width.

Figure Commands : All **Figure** related Commands, as opposed to **Line** related Commands, can now be found by clicking on the **Draw** menu heading and then clicking on the **Figure Commands** menu item. Some of these Commands, such as **Figure Rectangle**, **Figure Hatch** etc. have been moved from other menu positions, but three new Commands have been added namely, **Figure Copy**, **Figure Move** and **Figure Delete**.

A **Figure** is basically any series of connected **Lines** that form a closed polygon. The programme determines a circumscribing **Figure** when the cursor is placed inside the **Figure** and the required **Figure** Command is given.

Figure Copy [FC]

Place the Cursor inside the closed **Figure** that is to be **Copied** and closest to the **Figure** bend point onto which the Cursor is to be Snapped. Then, from the "**Draw**" main menu heading, select the "**Figure Commands**" item and select the "**Figure Copy**" Item (or give the keyboard **[FC]** Command). The Programme will then define the located boundaries of the **Figure** by highlighting them in purple. The Cursor will Snap onto the closest Figural bend point to where the Cursor was originally placed.

The **Figure** may then be **Moved** around by moving the Mouse (or Keyboard arrow keys), **Scaled** by using either the **[+]** or the **[-]** Commands, **Rotated** by using either the **[<]** or the **[>]** Commands.

When the required Position, Size and Orientation for the **Figure** have been reached, use the **[Enter]** Command, or click the Mouse [**LHB**] to Place the copied **Figure**. Note, that unless the Snap Mode has been disabled, the Figural point at which the Cursor is situated will "Snap" onto the nearest Snap Item. The original **Figure** will not be erased.

Figure Delete [FD]

Place the Cursor inside the closed **Figure** that is to be **Deleted**, and then from the "**Draw**" main menu heading, select the "**Figure Commands**" item and select the "**Figure Delete**" Item (or give the keyboard **[FD]** Command). The Programme will then define the located boundaries of the **Figure** by highlighting them in purple and will then proceed to **Delete** (erase) the defined **Figure**.
Note : This action can be reversed by using the "**UnDo**" function found under the **Edit** menu heading

Figure Move [FM]

Place the Cursor inside the closed **Figure** that is to be **Moved**, but closest to the **Figure** bend point onto which the Cursor is to be Snapped, and then from the "**Draw**" main menu heading, select the "**Figure Commands**" item and select the "**Figure Move**" Item (or give the keyboard **[FM]** Command). The Programme will then define the located boundaries of the **Figure** by highlighting them in purple. The Cursor will Snap onto the closest Figural bend point to where the Cursor was originally placed.

Whilst in the **Move** mode, the **Figure** may be **Moved** by moving the Mouse (or Keyboard arrow keys), **Scaled** by using either the **[+]** or the **[-]** Commands, **Rotated** by using either the **[<]** or the **[>]** Commands.

When the required Position, Size and Orientation for the **Figure** have been reached, use the **[Enter]** Command, or click the Mouse [**LHB**] to **Place** the **Figure**. Note, that unless the Snap Mode has been disabled, the Figural point at which the Cursor is situated will "Snap" onto the nearest Snap Item. The original **Figure** will be erased.

General Plan and Sectional Title CAD Programmes – New Functions

When writing **Line** data (Sides (Distances), Directions or both), **SURPAC** locates the nearest **Line** to the current cursor position and uses this **Line**'s terminals, or intersection positions, to define the direction and distance. The Commands used for these **Line** write actions are the keyboard "hot key" entries of [**U**] (Write Distance), [**T**] (Write Direction), [**F**] (Write Direction and Distance), [**f**] (Write Distance and Direction) and [**Y**] (Write Splay data). (*E.g. to write a **Line** Distance, locate the cursor close to, and on the correct side of, the required **Line** and then press the keyboard **U** key*).

To these existing Commands there has now been added a series of similar Commands, but which determine the Direction and/or Distance to be written by using User defined Co-ordinate file **Points** rather than a drawn **Line**. These new Commands use the same keyboard entry as above along with the simultaneous pressing of the [**Ctrl**] key.

For example, to write a **Line** Distance using **Points**, give the keyboard Command [**Ctrl**]+[**U**] (*i.e. simultaneously press the keyboard **Ctrl** and **U** keys*) and then click on the two required **Points**.

New Commands :-

[**Ctrl**]+[**U**] : After identifying the required two **Points**, the **Line Distance** will be written.
[**Ctrl**]+[**T**] : After identifying the required two **Points**, the **Line Direction** will be written.
[**Ctrl**]+[**F**] : After identifying the required two **Points**, the **Line Dirn** and **Dist** will be written.
[**Ctrl**]+[**f**] : After identifying the required two **Points**, the **Line Dist** and **Dirn** will be written.
[**Ctrl**]+[**Y**] : After identifying the required two **Points**, the **Line Splay Data** will be written.

These new Commands can also be activated by selecting the appropriate item from the **Data** menu heading.

Sectional Title CAD Programme – Option for Multiple Sheets for PQ Data

Normally, **SURPAC** displays/prints the **Participation Quota** information on an elongated A3 sheet. As this format apparently causes a problem with some of the **SG** Offices, a new option has been added to the programme which allows for the **Participation Quota** information top be printed on up to three separate A3 size sheets.

Extended "Lo" and "WG" Coverage for the TSM Databases

The databases for both the **Lo** and **WG** Systems has now been extended to provide better **TSM** coverage for most of the larger to medium size towns in South Africa. These databases are used for the automatic co-ordinate transformations between the Clarke 1880 (Modified) based "**Lo**" System to the WGS 84 (Hartebeeshoek94) based "**WG**" System, and also in the "Locate and Add Nearest Trig/TSM Beacons" programme in **SURPAC**.

Please download the file called "**Surpac Control Files.exe**" that can be found on the same Web page as the **SURPAC** Upgrade file. This file is a self extracting WinRAR file and once it has been downloaded, click on the file's icon and the two new database files will be re-generated and stored in the **SURPAC** folder.

My thanks to Willem Knoetze of Danabaai for supplying the bulk of this information, and to Steve Johnston for the Malmesbury data.

General Modifications made to SURPAC Software

Support for the Topcon GPT – 3000 Series Total Station

SURPAC now supports this Total Station for the downloading of both **Observation** data and **Co-ordinate** data, plus the uploading of **Co-ordinate** data.

General Plan and Sectional Title CAD Programmes – Removal of "Error 9" problem

The annoying "**Error 9**" error message that would appear after an hour or so of running one of these programmes, has now been hunted down and eliminated!

General Plan and Sectional Title CAD Programmes – Line Generate Command

The **Line Generate** Command was not always drawing the defined **Line** from the current cursor position. This has now been corrected.

General Plan and Sectional Title CAD Programmes – Point Circles in Insets

When creating Insets (by using the **Frame Zoom** Command), the included **Point Circles** were also zoomed, making them too big. This has now been corrected.

All CAD Programmes – Frame Copy Command

Arcs and **Circles** that were included in the **Frame** were displayed on screen when the **Frame Copy** Command was given, but the items were not stored. This problem has now been rectified.

Co-ordinate Editing Programme – Use of the [Ctrl] and [Shft] Keys

The use of the [**Ctrl**] and [**Shft**] keys in this programme have been improved.

To **highlight random** data lines to be used for Copying, Deleting etc., hold down the [**Ctrl**] key and then click on the data lines required.

To highlight a block of lines to be used for Copying, Deleting etc., hold down the [**Shft**] key and then click on the data lines required.

Observation File Loading/Editing Programme – Field Book Printing

When printing **Field Book** information from an **Observation File**, the **Inactive** data lines were included in the **Field Book** instead of being omitted. This has now been corrected

Points Off Line Calculations Programme – Naming of Re-calculated Points

The programme would sometimes change the **Name** of a Point that had been re-calculated to its "on-line" position. This has now been corrected.

SURPAC Programmes Modifications for Version 5.31, Release 02

This latest **SURPAC** Upgrade has been designed for Users running **SURPAC** under either the ***Microsoft* Windows XP**, or the ***Microsoft* Windows Vista** operating systems. Other Users running any of the older **Windows** operating systems, such as **Windows 98**, **Windows NT** or **Windows 2000** may still install this Upgrade. However, should any problems result from the installation of this Upgrade, please revert to the previous Upgrade used. No guarantees can be given that **Version 5.31**, or any later version, will run correctly under the older **Windows** operating systems.

This is another reminder to all Users, that the installation of **SURPAC** on a PC/Laptop running ***Microsoft* Windows Vista** requires a **SURPAC** for **Windows Vista/XP Version 5.31** (or later) installation CD. You cannot install **SURPAC** from a pre-Version 5.31 installation CD and then upgrade to Version 5.31. There are numerous, fundamental system changes between **Windows XP** and **Windows Vista** that make this impossible. If you need a **SURPAC** for **Windows Vista/XP Version 5.31** installation CD and you have a current **SURPAC** Software Maintenance Contract, then please let me know and I will courier one to you. The price for this CD is R150.00, to cover costs and postage.

At this time, I would not advise anyone to rush into switching from **Windows XP** to **Windows Vista**. There obviously needs to be a "settling in" time for **Vista**. **SURPAC** itself appears to be running well under **Vista** for those Users who have currently opted for the **Vista** operating system. However, you may well find that **Vista** does not support some of your other software, and there may not be **Vista** drivers available for your printers or plotters etc.

All CAD Programmes – Line Drawing whilst changing Scale

It is now possible to change the screen scale of a drawing Sheet whilst in the **Line Drawing** mode. This enables **Zooming** (normally using the mouse scroll wheel) into a congested area, for example, to ensure that the Point/Line used as the line terminal is the correct one.

It is also possible to **Pan** about a screen display of a drawing Sheet whilst in the **Line Drawing** mode. This is done by holding down the mouse [LHB], panning to the required area, and then continuing to move the mouse cursor onto the required position.

All CAD Programmes – Undo Previous Tasks

This is not a new function and has been incorporated in **SURPAC** for the past four years. However, from recent feedback from a number of Users regarding encountered problems, it is obvious that a fair number of Users are still unaware of the "Undo" facilities incorporated in all the **SURPAC CAD** programmes. So, here is a reminder :-

Undo Previous Task

The first of these two functions allows the User to backtrack (or **Undo**) up to **9 Drawing Tasks** carried out in the current programme session. A **Drawing Task** is any screen activity that modifies data on the current drawing, e.g. **Lines**, **Arcs**, **Circles**, **Text Items**, **Hatching**, **Contours**, **Graphic Items** etc. Activities such as changing Scale, Orientation etc. are not considered as drawing tasks, as these may be changed at any time by the User.

To **Undo** a **Drawing Task**, either :-

3. From the **CAD** programme's "**Edit**" Menu Heading, select the item called "**Undo Previous Task**", or

4. Use the keyboard **Ctrl+Z** function (i.e. press and hold down the **Ctrl** key and, at the same time, press the **Z** key.)

Once a maximum of 9 "**Undo**" operations have been done, the "**Undo Previous Task**" menu item will be "greyed out" (made non-active), indicating that no more **Undo** tasks can be undertaken. This menu item will become re-activated when you perform further **Drawing Tasks**.

Undo All Session Tasks

The second of the two **Undo** functions allows the User to **Undo All Drawing Tasks** carried out during the current session. The drawing will revert to the state it was in when it was loaded at the start of the session. Use this feature with caution!!

To **Undo All Session Drawing Tasks**, either :-

3. From the **CAD** programme's "**Edit**" Menu Heading, select the item called "**Undo All Session Tasks**", or
4. Use the keyboard **Ctrl+Q** function (i.e. press and hold down the **Ctrl** key and, at the same time, press the **Q** key.)

The time taken for **SURPAC** to perform an **Undo** action depends on both the speed of the computer used and the complexity of the drawing involved. For an average General Plan, CAD drawing etc., and when using a fast PC, the time taken is negligible, being a few hundreds of a second. Complex drawings that include Graphic images, for example, could take a few seconds.

General CAD Programme – New Point Function

A new feature has been added to the **General CAD Programme**, viz

Print/Plot Point Co-ordinates [PC] : This function, or command, will print either the Point's **Planar** co-ordinates ([**Y**, **X**] or [**E**, **N**] values), or the Point's **Geographical** co-ordinates ([**Latitude**, **Longitude**] values).

These printed items are stored as **Text** items, and can be edited/moved/deleted etc. like any **Text** item on the Sheet.

To use this function, do the following :-

1. If you want to print a Point's **Planar** co-ordinates, make sure that the menu item "***Dynamic [Lat, Long] display***" under the "***General***" menu heading is not selected (i.e. its icon is not highlighted), or

   If you want to print a Point's **Geographical** co-ordinates, make sure that the menu item "***Dynamic [Lat, Long] display***" under the "***General***" menu heading has been selected (i.e. its icon is highlighted).

2. Select the required **Text Colour** for the co-ordinate printing. The **Text Size** used will be the currently set Default Data Text Size, which can be modified through the "***CAD Sheet Setup Information***" menu option.

3. Move the cursor close to (within the current **Snap Radius** range) the required Point.

4. Either select the "***Print/Plot Co-ordinates menu item***" from the "***Point***" menu heading, or just enter the keyboard short cut Command [**PC**].

General Modifications made to SURPAC Software

Section title CAD Programme – Participation Quota Extension

The **Participation Quota** function can now create separate A3 and/or A4 Sheets to accommodate up to **340** areas.

Contour CAD Programme – Sending Point Nodes to a DXF or DWG File

When sending the Sheet output to a **DXF**, or **DWG** file, the Point Node information (if used) will now be placed on a different Layer from the Spot Height data.

Diagram CAD Programme – Removal of the Heading Text misplacement problem

The random repositioning of some Header **Text** items that sometimes occurred when creating a Diagram, or on moving or copying a block of **Text**, has now been removed.

Locate and Store the Nearest Trig. Beacons – Removal of Error 9 problem

Due to the large increase in the number of Trig. Beacons and TSMs in the **SURPAC** transformation files recently, this programme was generating an "*Error 9 – Subscript out of range*" error for areas in the Western Cape. This problem has now been fixed up.

Using the new electronic "Help" pages system

Windows Vista prevents the use of the type of electronic **Help** pages that were previously included with **SURPAC** Software (via the [**F1**] special function key). Therefore, the **Help** file has now been changed into to a new, **Vista** compatible, format. The information can still be accessed via the [**F1**] file, as before. If, after pressing the [**F1**] key, the **Help** information is placed behind the **SURPAC** forms (i.e. is not visible), just click the appropriate icon in the **Windows Task Bar**, normally at the bottom of the screen.

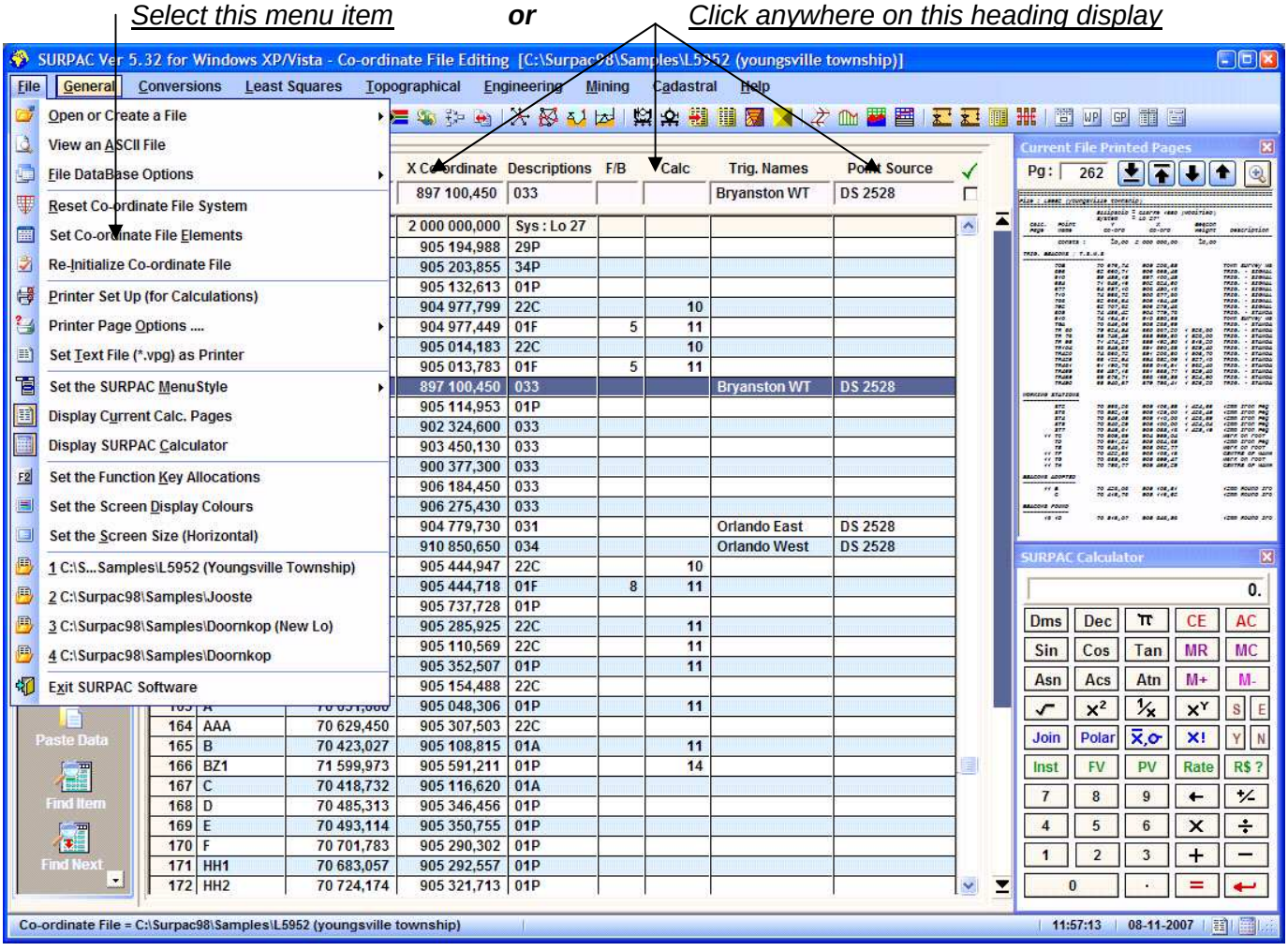
SURPAC Programmes Modifications for Version 5.32, Release 01

Co-ordinate File – Addition of Point Text Label Fields

This is the first time since the introduction of **SURPAC for Windows** (in 1998), that the **Co-ordinate** file structure has been modified. With the new format, it is now possible to allocate one, or two, **Text Label Fields** to each of the Points displayed in a **Co-ordinate** file.

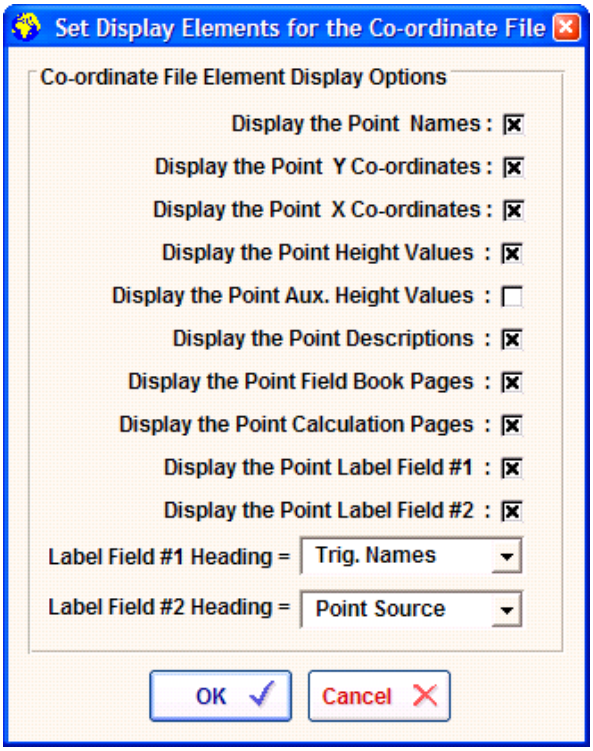
Using the "*Set Co-ordinate File Elements*" function, it is now possible to define one, or two, new columns (elements) for a Co-ordinate file and to also define the headings for these columns.

To define these columns, either Click the **SURPAC** main menu heading "**File**" and then select the menu item "*Set the Co-ordinate File Elements*", or simply just Click (left button or right button) anywhere on the currently displayed Co-ordinate file headings.



Once this is done, a form will be displayed that allows you to select which of the available columns, or elements are to be visible (utilized) for the current Co-ordinate file. On the same form, drop down lists are available which allow you to allocate the required headings for the two new **Label Fields**.

In the example shown above, the two **Label Fields** have been labelled as "**Trig. Names**" and "**Point Source**", respectively. The drop down lists provide various other headings for User selection.


Set Display Elements for the Co-ordinate File
Co-ordinate File Element Display Options
Display the Point Names :
Display the Point Y Co-ordinates :
Display the Point X Co-ordinates :
Display the Point Height Values :
Display the Point Aux. Height Values :
Display the Point Descriptions :
Display the Point Field Book Pages :
Display the Point Calculation Pages :
Display the Point Label Field #1 :
Display the Point Label Field #2 :
Label Field #1 Heading = Trig. Names
Label Field #2 Heading = Point Source
OK
Cancel

When this form is displayed, check, or un-check, the elements that are to be displayed, or hiidden. Note that the **Point Names**, **Y Co-ordinates** and **X Co-ordinates** must be displayed, as these items represent the minimum display for any Point.

If one, or both, of the **Label Fields** are selected as visible, then you can select the required heading for each **Label Field** from the displayed drop down lists.
Whilst these **Label Fields** are in general passive (descriptive) items, there are certain instances where these items are used by **SURPAC** programmes. For example, setting the heading of one of the **Label Fields** as "**Trig**. **Names**" will be used by the **Diagram CAD** programme, whereby the **Name** of a **Trig**. **Beacon** shown on a **Diagram** will be included as well as its Number. For Co-ordinate file listings, the "**Trig**. **Names**" will be shown in the columns normally reserved for F/B and **Calc**. **Page**.

If one of the **Fields** is designates "**Back Peg**", then this column will have the name of the Back Peg automatically placed in it when a **Mining U/G Peg** c**alculation** is carried out.

In order to display a large number of columns, or elements, simultaneoulsy in a **Co-ordinate** file, such as the example shown on the previous page, you will need to make sure that the PC **Screen Resolution** is set to a sufficently high level. For example, if you have a 19", or larger, monitor, set the **Screen Resolution** to **1280 x 1024** pixels. However, If you are unable to set your monitor to a resolution of higher than 1024 x 768 (which is the the minimum requirement for **SURPAC**), **SURPAC** will display a horizontal scroll bar that will allow you to scroll between different display areas of the Co-ordinate file.

*NB : If you are running **Windows XP** and you re-set the **Screen Resolution**, make sure that the **Color Quality** is set back to **16 bit**, and not 32 bit, before accepting the new setting.*

The two new **Label Field** items of a Co-ordinate file are held in a file called "******.**CRL**". Therefore, if you are **Copyng** a Co-ordinate file **(******.WCR**) to another location, remember to also **Copy** the file ******.WCL**.

General Modifications made to SURPAC Software

Setting Out Data – Line Running

This function sometimes displayed the Points to be placed, or checked, in the incorrect order. This resulted in some distances being shown as negative. This has now been corrected.

Point Comparisons using different files – Height values and displayed Directions

The **Height** values for File #2 were not being displayed, or compared, correctly. This has now been fixed up.

The polar values of the differences between two compared Points were showing the **Directions** incorrectly. The values were displayed in *Deg.decimal* format, instead of the usual *Deg Min Sec* format. This has now been corrected.

Locate and mean Point Groups in a file – Height differences not displayed

The programme was only showing the **DY** and **DX** values. The **DZ** (**Height** differences) values have now been added.

Diagram Creation CAD Programme

When using the [**PD**] - **Point Display** command, the programme now displays the **File Name**, as well as the **Diagram Name**, **Y Co-ord**, **X Co-ord** and **Description** of the found **Point**. In order for this function to work correctly, the current **Co-ordinate** file must be the same file as used for the **Diagram** construction.

The [**Ctrl**]+[**M**] – **Figure Move**, **Scale**, **Swing** command has also been improved for when the figure is swung. The **Line** and **Text** items located inside the drawing area for a figure are now defined and manipulated more efficiently.

General Plan CAD Programme

The use of the **[F11] – Auto Write Stand & Area** command has been improved. As before, when you first give the command, the command's form is displayed allowing you to select various options. If you then use the **Mouse** [**MB**] to repeat the command, the form is no longer displayed, with the next default Stand/Erf number being applied for the calculation. Therefore :-

To start a series of **Auto Write Stand & Area** actions, use the [**F11**] command,

To continue with a series of **Auto Write Stand & Area** actions, use the **Mouse** [**MB**],

To re-start a series of **Auto Write Stand & Area** actions (to re-set the Stand/Erf number, for example), use the [**F11**] command.

All SURPAC CAD Programmes – Point Locate and Zoom

When using the [**PL**] **Point Locate** command, the programme will centre the sheet display about the **Located Point**, and will also **Zoom** closer on to the Point.

Basic Co-ord/Distance/Area Conversions

This programme was not allowing for User selection of Points from a defined source Co-ordinate file. Now, once you have defined the output (target) file for the converted Points, the programme offers you the choice of converting all the Points in the source file. If you reply "No" to this option, a listing of the Points in the source file will e displayed at the bottom right part of the form, allowing you to select (tick) the Points that you want converted.;

Support for the Sokkia Instrument Mining Software (SDR ASCII File format)

SURPAC now supports the **Sokkia** Instrument Mining Software format for the calculation of **Mining U/G Pegs**, when using the **Double Button** method. **SURPAC** will import data from a **Sokkia SDR ASCII** file into an **Observation** file, as usual. When calculating the Peg from the **Observation** file, **SURPAC** will combine certain observations to separate the "Top Peg" and "Bottom Peg" readings.

Merging Points from another SURPAC Co-ordinate file

This routine was locking on to the Points of the first file defined source file for Point merging. Even if you subsequently elected to merge from another file, the first defined file would remain as the source file for Point selection. This has now been corrected.

SURPAC Version 5.32, Release 02 - Programme Modifications

General Modifications made to SURPAC Software

As this **SURPAC** Upgrade is being issued within 3 weeks of the previous Upgrade, there are not a lot of changes or additions. However, those that have been made are quite important.

Co-ordinate File Label Field Elements (columns) Copy and Paste

The two text **Label Fields** (when selected) now support the normal **Windows Copy** (**Ctrl C**) and Paste (**Ctrl V**) functions.

Diagram Creation CAD Programme – Curvilinear Boundaries

A **Bezier Curve** function has been added to allow for the better display of **curvilinear boundaries**. This Command allows for the drawing (and plotting) of **Bezier Curves** though a number of User defined Points. This Command is activated by selecting the **Bezier Curve** Fitting menu item under the programme's **Line** menu heading. After this, simply Click the Mouse [LHB] on a series of positions (any position, Point or Line terminal) that you want to use to define the **Bezier Curve**.

As you progress, the **Bezier Curve** will be displayed, in purple, through the positions selected. When you reach the last required position, Click the Mouse [RHB]. The **Curve** function will now close and the completed curve will be drawn in the colour of the current Pen. This function should only be carried out when the **Diagram** figure has a normal, 0°, swing.

Problem when Editing the VPG pages

In the last Upgrade, it was noticed that there was a problem with the editing of the **VPG** (virtual pages) file, associated with a **Co-ordinate** file. This problem has now been sorted out.

Problem when Copying a Co-ordinate File Listing to the Clipboard

Copying a **Co-ordinate** file to the **Windows Clipboard** could sometimes cause the listing to be aborted, if one or more of the **Label Fields** were displayed. This problem has now been rectified.
The **Copied** listing now also strips all trailing blanks from all lines, for easier editing of the data.

Problem when SURPAC is Maximised mode and Label Fields are displayed

When one or more of the Text **Label Fields** were displayed for a **Co-ordinate** file, and the **SURPAC** application was set to the **Maximized** mode, an error 384 *("cannot move or size a form when Minimized or Maximized"*) was displayed. This problem has now been fixed up.

SURPAC Version 5.32, Release 03 - Programme Modifications

New functions added to SURPAC Software

Co-ordinate Text Label Fields – New function

The two text **Label Fields** can now be used to display the **Latitude** and **Longitude** values of Points, when an appropriate Co-ordinate System has been selected. When setting the **Display Elements** for a **Co-ordinate** file, you can now set **Label Field #1** as **Latitude** and **Label Field #2** as **Longitude**.

The **Latitude** and **Longitude** elements are not directly editable and are dependent on the **Y** and **X** (or **N** and **E**) values defined for a Point. If the Point co-ordinates are modified, then the **Latitude** and **Longitude** will be modified accordingly.

When first setting the **Label Fields** as **Latitude** and **Longitude**, all existing Points in the current Co-ordinate file will have their **Latitude** and **Longitude** displayed.

Using the "Landscape" Orientation to Print a Co-ordinate List

With the introduction of the **Label Fields** for a **Co-ordinate file**, the page width required for a **Co-ordinate file** listing is often wider than can be provided by an **A4** sheet in the **"Portrait"** orientation. To circumvent this problem, it is now possible to print a Co-ordinate file listing in the **"Landscape"** orientation.

To set the current Printer in the **"Landscape"** mode, do the following :-

1. From the "**File**" main menu heading, select the menu item "**Printer Set Up (for calculations)**"
2. On the displayed **Printer Settings** form, change the **Paper Orientation** setting to **"Landscape"**.
3. Print the Co-ordinate file in the normal manner.
4. Remember to revert the Printer orientation back to **"Portrait"** after printing the list, otherwise all subsequent printing will be in the **"Landscape"** orientation.
5. This function only applies to direct printing and not to pages stored as **VPG** pages.

Using Windows Short Cut Keys for File Editing

When editing a **Co-ordinate** file, an **Observation** file or a **Tacheometric** file, it is now possible to use the **Windows** style short cut keys for the editing functions, as listed below :-

Short Cut Keys	Function
Ctrl+C	***Copy***
Ctrl+V	***Paste***
Ctrl+X	***Cut***
Ctrl+A	***Select All***
Delete	***Delete***

The ***Ctrl+C***, ***CTRL+X*** and ***Delete*** functions are applied to those highlighted points/rows at the time the command is given.

To highlight **Selected Points** in the **Co-ordinate** file, click on the first required Point then, holding down the ***Ctrl*** key, Click one at a time on the remaining required Points.

To highlight a **Block of Points** in any of the above mentioned files, click on the first Point of the required Block then, holding down the ***Shift*** key, Click on the last point of the required Block.

Addition of "Internal Beacon" Category for the General Plan CAD Programme

A new category has been added for the **General Plan** Data Sheet output. This new category, with the heading of "**Internal Beacons**", is to cater for cases where a road is defined as an erf, or stand (i.e. a part of the township), and not as a public road. This is applicable in cases where access to individual erven, or stands, within the township is to be made by means of a private (communally owned) road and not by a public road.

In order to define a Point on a **GP** as being an **Internal Beacon**, it must have a **Description Code** of **28** (e.g. **28P**, **28F** etc.). All Points defining a private road (as an erf/stand), that would normally be defined as Block Corners, must have a Description Code of **28**.

All Points that have been Named (**N1** – **N9** commands) on a **GP** and which have a Description Code of **28** will be included on the **GP Data Sheet** under the heading "**Internal Beacons**".

General Plan – Sides & Directions ASCII File from the "Area by Point Definition" function

When using the "**Area by Point Definition**" function in the **General Plan CAD** programme, it is now possible to create an **ASCII** file that shows either all data, including co-ordinates, or that shows the **Sides** (A-B, B-C etc.), the **Directions** and the **Distances** of the figure defined.

This **ASCII** file can then be imported, onto any position on the **GP**, using the "**ASCII File Text Import**" option in order to include the file data as **Text items** on the **GP** Sheet. This would be applicable to large erven/stands (such as the private roads discussed above) that cannot be shown on a single **GP** sheet.

Corrections and Modifications made to SURPAC Software

Sectional Title CAD Programme

A problem with the generation and display of a multi sheet **Participation Quota** list has been rectified.

The total number of areas that can be displayed for a single **Participation Quota** listing has now been increased to **405**.

Point Comparison using two different Co-ordinate Files

When comparing two **Co-ordinate files**, using the **Comparison by Co-ordinates** option, the **Heights** were not being compared correctly. This has now been fixed up.

Text Labels for newly calculated Points in a Co-ordinate File

If a **Text Label** was added to an existing Point in the current **Co-ordinate file**, this added **Label** value was retained in memory and was then automatically added to any newly calculated Point. This has now been corrected. Newly calculated Points will have no **Text Labels** attached, except in the case of the **Text Labels** being defined as **Latitude** and **Longitude**.

Importing Data from one General CAD Sheet to another

When importing data from one **General CAD** Sheet to another, only the data related to **Pens** (or Layers) **1-8** were being imported, and not **Pens 9-14**. This has now been corrected.

DXF/DWG output of Diagrams

When exporting a **Diagram** as a **DXF** or **DWG** file, the lines were not being correctly trimmed to the edge of the **Point Circles**. This has now been rectified.

Co-ordinate File Editing - Maintaining Co-ordinate Accuracy

When renaming a Point, or editing any one of its co-ordinate values, all co-ordinate values were automatically restored to an accuracy of only 3 decimal places. Although this made no visible or practical difference, it did effect **Directions** in a subsequent **General Plan** construction. This was especially applicable to short distances, such as splays. This problem has now been rectified, and editing any element of an existing Point will not cause the re-adjustment of the values of any other co-ordinate element.

Co-ordinate File Editing – File to File transfer using the Copy and Paste functions

When using the **Copy** and **Paste** functions in order to transfer a set of Points from one **Co-ordinate file** to another, some of the Point data was missing, such as Text Labels and/or Descriptions. This has now been corrected.

When using the **Copy** and **Paste** functions to transfer data between two **Co-ordinate files**, make sure that both file are using the same element (column) display structure, otherwise descriptive data can end up in the incorrect columns.

Printing Setting out Sheets

In some cases, the programme was retrieving incorrect co-ordinates for the **Set Up** Point(s). This only appeared to happen in a limited number of cases, but in order to prevent this from re-occurring, the co-ordinate location routine for this programme has now been modified.

Point Off-Line Calculations

This programme has been causing intermittent problems for some time. When moving **Off-Line** Points to their **On-Line** positions, the programme would sometimes, and without any pattern, allocate incorrect co-ordinates to one, or more of the Points moved. This now appears to have been fixed up, but please let me know if you still experience a problem in this regard.

SURPAC Version 5.33, Release 01 - Programme Modifications

All SURPAC CAD Programmes – New Text Item Length

Changing CAD programme Text items to maximum of 160 characters

After receiving several requests from Users, it was decided to change the maximum length of **Text Items** in the **CAD** Programmes from **80** characters to **160** characters. Any **Text Item** written, or edited, may now consist of up to 160 characters

In order to do this, and to ensure that all existing Text data are retained, **SURPAC** will automatically convert an existing **CAD** Text files from the old 80 character format to the new 160 character format, whenever a **CAD** Sheet is opened. This is a fast and seamless operation and will happen without any delay or prompts.

The main reason for changing the Version of **SURPAC** from 5.32 to 5.33 is due to this change in the Text file structure. Any version prior to 5.33 will use the 80 character length Text file format, whilst versions 5.33 onwards will use the 160 character length Text file.

All **SURPAC CAD** Programmes now include a function for the conversion of the 160 character Text file format back to the 80 character Text file format. This is to allow for the possibility that data files might have to be sent to a User who still runs a pre-5.33 version of **SURPAC**. This function can be found under the "**File**" menu heading on all **CAD** Programmes.

When converting a 160 character Text file back to the 80 character Text format, al **Text Items** will be truncated to the left hand 80 characters.

If you have multiple copies of **SURPAC** running in your office, make sure that when upgrading, all installations are upgraded to Version 5.33. Once converted to the 160 character format, a Text file will not be readable from an earlier version of **SURPAC**. If it has to be read by a pre-5.33 version of **SURPAC**, the file will have to be converted from the 160 to the 80 character format, using the above mentioned **SURPAC** Version 5.33 function.

Using a PDF creator software when Plotting from SURPAC

Using the "deskPDF" Software

PDF (**P**ortable **D**ocument **F**ormat) is a widely used format for viewing and transferring documents of various type, including plans and diagrams. There are various applications that will read and display **PDF** documents, such as **Adobe Reader**, that can be downloaded from the internet, free of charge.

For example, the **Adobe Reader** can be downloaded from :-

http://www.adobe.com/products/acrobat/readstep2.html

Applications that create **PDF** files, however, are not free. Scouting through the Internet, I have found an excellent, and relatively cheap application that performs a number of **PDF** creation operations, including the creation of **PDF** files directly out of the **SURPAC CAD** programmes. This application is called "**deskPDF Standard**" and it only costs US$19.95 (about ZAR160).

Once installed, this application will set itself up as a Printer device and will be displayed in the list of available Printers. To create a **PDF** file of your document directly from **SURPAC**, you print the document (or **CAD** Sheet, or **Diagram** etc.), you select the usual "**Output to a Printer/Plotter**" menu option, and then simply select the printer called "**deskPDF**" out of the list of available printers. You need to set the required size for the document (A4 – A0), the required sheet orientation (Portrait or Landscape), and **deskPDF** will then create and save the **PDF** file. The **PDF** file can then be viewed via **Adobe Reader**, or any other **PDF** reader, and also e-mailed as an attachment to a client or any other interested person. **deskPDF** is

also able to carry out conversations of ***Microsoft*** **Word**, **Excel**, **Access** files etc. into **PDF** format files.

Although the **DXF** format will always have its own unique place in the transference of information, **PDF** files created via **deskPDF** do have certain advantages over **DXF** files. First, the **PDF** documents provide a truer reproduction of their original **SURPAC CAD** Sheets. Secondly, anyone receiving a **PDF** file does not need to have any expensive software (such as AutoCAD) in order to view the document. Thirdly, **PDF** files avoid the quagmire of different **DXF** versions that abound and which can cause annoying and time wasting compatibility problems.

If you are interested in purchasing the **deskPDF** software, please visit :-

http://www.docudesk.com/desk_pdf_standard.shtml

and follow the screen instructions. You will need a credit card to make the required payment.

General Modifications

Option to automatically Maximise the Windows display for CAD Programmes

Personally, when using high resolution monitors (e.g. 1680 x 1050 pixels), I prefer to have **SURPAC** running in a window that occupies only the left half of the screen when carrying out any of the calculation routines. This prevents large areas of blank, grey background filling the screen instead of leaving it available for other applications that might also be running. However, when using any of the **SURPAC CAD** programmes, I prefer the sheet display to occupy the entire screen, as this makes it easier to move (pan) around the drawing.

On the assumption that other users might also prefer this arrangement, I have introduced a new option that maintains **SURPAC** in a user defined window and position whilst in calculation mode, but changes the display to full screen mode whenever a **CAD** programme is used. On closing the **CAD** programme, the display reverts to the use defined window.

To enable this option, select and run the **Co-ordinate File Editing** programme (which is the default programme when running **SURPAC**), and then Click the [**File Options**] button in the **Actions Bar** menu. The **Co-ordinate File Options** form will be displayed. In the bottom right hand panel of this form. Click the **Maximize Screen Display for CAD Programmes** option, making sure that the check box displays an "**X**".

The same procedure can be used to remove the option (making sure that the check box is blank), if the feature is no longer required.

Option to Paste Areas into General Plan and Sectional Title Area Files.

The option to **Paste Areas** into **Area** files of these two **CAD** programmes has been added to **SURPAC**.

Data to be imported must be of the structure :-
Erf/Stand Name/Number [TAB] Area (in m²) (Note the items must be TAB separated)

When **Copying** data from another **SURPAC Area** file, the format generated is automatically that shown above.

This option is particularly useful when **Area** data need to be transferred from one file (e.g. Phase 1 of a Sectional Title development) to a new file, without having to re-calculate the **Areas**.

SURPAC Version 5.33, Release 02 - Programme Modifications

SURPAC General CAD Programme

Importing ESRI Shapefiles (*.shp) into SURPAC via DXF

Although **Shapefiles** (***.shp**) cannot be imported directly into **SURPAC**, there are various applications available that will convert **Shapefiles** into the **DXF** format. Some users have in the past asked for the ability to import **Shapefiles** into **SURPAC**, so here is a convenient solution :-

Download and install the application called **DXF Author**. This application was written by **ESRI** in Massachusetts, USA, and can be downloaded free of charge. Although I normally dislike recommending free application downloads, this one seems to work well, is simple to use and produces the desired results.

Enter the URL **http://www.mass.gov/mgis/dxf.htm**

Complete the 3 information boxes and then click on the [**Download DXF Author**] button. After downloading, follow the installation instructions provided.

Using this application, a **Shapefile** for the African continent, for example, can be converted into **DXF** and then loaded into a **SURPAC General CAD** Sheet, as shown here.

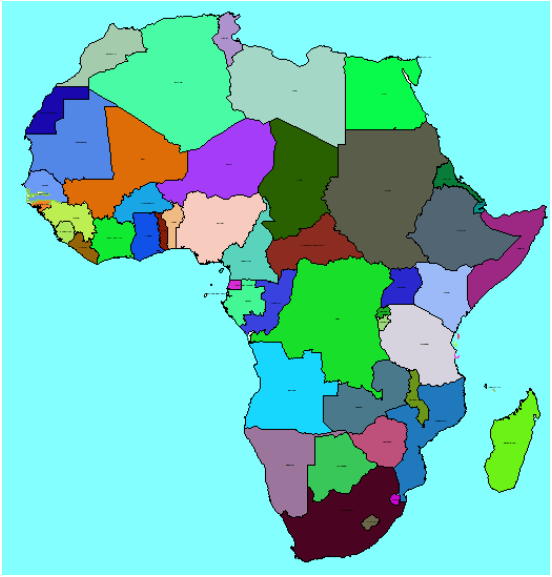
Addition of the new "Fill" Commands

The **General CAD** programme now includes commands for **Filling** a User defined area. The area can be any closed figure, bounded by lines of any colour. The boundary lines can be a figure created from a series of straight lines, be a closed set of connected spline curves, or be a closed figure created by using the **Sketch** mode.

When **Filling** the figure with a colour, you may select either the current **Hatch Colour**, or a colour selected at **Random** by the programme.

Any **Filled** area my be **Deleted** a any stage. If you are going to delete both the **Fill** colour and the figure itself, make sure that the bounding figure is deleted before deleting the **Fill** colour.

The display of **Filled** areas may be turned on, or off, at any stage. Note, that when **Printing** a General CAD Sheet, the **Filled** areas cannot be directly printed. In order to create a hard copy output of a Sheet containing **Filled** areas, first create a Graphic image (.jpg, .tif etc.) of the Sheet from **SURPAC**, then use any image printing software to print the image.



Using the **Fill** option with **Random Colours**, the map of Africa displayed above (imported from a **Shapefile** that has been converted to a **DXF** file) can now be displayed in colour.

Setting the General CAD Sheet Size via User Selected Dimensions

The **Sheet size** of a **General CAD** Sheet can now be User defined. When opening a new Sheet, or modifying an existing Sheet, use the **Sheet Information** display to set the required **Sheet length** and **Height**.

Importing DXF "SPLINE" data

The **General CAD DXF** import function can now support the **DXF** "**SPLINE**" formatted data. These lines are imported as a series of connected, straight Lines. If a **Bezier** (**Spline**) **Curve** series through these Line junction points is required, then this can be done by selecting the "**Bezier Curve Fitting**" menu item, under the "**Draw**" menu heading.

Please note that **SURPAC** will only import **DXF**, or **DWG** files that are compatible with **AutoCAD 2005**, or earlier versions (*such as AutoCAD 2000, Release 13, Release 12 etc*.). At this stage, **AutoCAD 2007 DXF** and **DWG** files can not be imported into **SURPAC**.

General SURPAC Modifications

Diagram CAD Programme

The problem with the "vanishing Point B" on the **Diagram** Figure has now been resolved. This problem sometimes occurred when the **Frame Move**, or **Frame Copy** commands were used.

General CAD, General Plan CAD and Working Plan CAD Programmes

All the above programmes had had a new Command added. This newly added Command is the **Line Intersection : Intersection Angle display** Command. Using this Command will display the **Directions** of two User identified **Lines**, as well as the **Intersection Angle** made by the two **Lines**. Except for **Lines** that are either parallel or perpendicular to one another, the two possible **Intersection Angles** are displayed.

This Command is included as one of the **Line Intersect** Commands. To use the Command, either Click the "**Line**" (or "**Draw**") menu heading, select the "**Line Intersections**" menu item and then the
"**Intersection Angle**" sub-menu item, or simply enter the keyboard shortcut **LII**.

To complete the operation, identify the two required **Lines** by Clicking on, or close, to each in turn.

Modification to the SURPAC "Lo" System Data Base

An error was found in one of the Trig. Beacons in the Free State area (*Trig 361, DS 2926*). The given X ordinate in the listing (1996 listing of "Lo", or Cape Datum, values) was 1.00m in error. This has now been rectified in the **SURPAC** data base. If you feel that this change might affect any of your future surveys, please re-download and store the self-extracting file called "**Surpac Control Files.exe**", which can be found on the same web page as the **SURPAC** Upgrade file, and then install its compressed files by double clicking its icon.

Contour CAD Programme

Improvements have been made to the output of **Contours** to both the AutoCAD **DXF** and **DWG** file formats. This applies to Contours when either smoothed (spline fit) or unsmoothed.

Loading Data from a Leica GSI 16-Digit format ASCII file

Both co-ordinate and observation data may now be downloaded from a **Leica GSI 16-Digit ASCII** file. Some of the Leica precision instruments use the 16-Digit format for storing and transferring data, as opposed to the standard 8-Digit format files.

Mining : Peg Fixing Programmes

The **Grade** calculation routine has been modified so as to allow the User entered **Grade** value to have a 4 decimal place accuracy.

SURPAC Version 5.34, Release 01 - Programme Modifications

Compliance with the SGO MML requirements

The Offices of the Surveyors General of Gauteng, Limpopo and Mpumalanga provinces recently decided to adopt the Mass Media Lodgement (**MML**) of documents from Land Surveyors in these provinces, via e-mail. The file format decided upon is **PDF** (**P**ortable **D**ocument **F**ormat).

In a previous **SURPAC** Upgrade, I pointed out the advantages of installing a **PDF** "printer" device to enable the creation of **PDF** documents directly from **SURPAC**. This applies to **CAD** Sheets, such as **General Plans** and **Diagrams** etc. and also to creating a single **PDF** document containing all the **Printed Pages** related to the current survey.

The benefits of acquiring a **PDF** capability are outlined below :-

Using a PDF "Printer" Device

PDF (**P**ortable **D**ocument **F**ormat) is a widely used format for viewing and transferring documents of various type, including plans and diagrams. There are various applications that will read and display **PDF** documents, such as **Adobe Reader**, that can be downloaded from the internet, free of charge.

For example, the **Adobe Reader** can be downloaded from :-

http://www.adobe.com/products/acrobat/readstep2.html

Applications that create and/or edit **PDF** files, however, are not all free. Scouting through the Internet, I have found an excellent, and relatively cheap application that performs a number of **PDF** creation operations, including the creation of **PDF** files directly out of the **SURPAC CAD** programmes. This application is called "**deskPDF Standard**" and it only costs US$19.95 (about ZAR200).

Some **SURPAC** Users have let me know that there are other, free applications that do the same thing as **deskPDF** (such as **CutePDF Writer**) available. However, I have stuck to using **deskPDF** as it works well and provides good software support.

If you are interested in purchasing the **deskPDF** software, please visit :-

http://www.docudesk.com/desk_pdf_standard.shtml

and follow the screen instructions. You will need a credit card to make the required payment

Creating PDF files for SURPAC CAD Sheets :-

Once installed, this application will set itself up as a "Printer" device and will be displayed in the list of available Printers. To create a **PDF** file of your document directly from **SURPAC** run the appropriate **SURPAC** programme to display the required **CAD** Sheet, (**GP**, **Diagram** etc.), then select the usual "**Output to a Printer/Plotter**" menu option. Then select the printer called "**deskPDF**", out of the list of available printers.

You will need to set the required size for the document (A4 – A0), the required sheet orientation (Portrait or Landscape), the resolution (dots per inch) and **deskPDF** will then create and save the **PDF** file. The **PDF** file can then be viewed via **Adobe Reader**, or any other **PDF** reader, and also e-mailed as an attachment to a client or any other interested person. **deskPDF** is also able to carry out conversations of ***Microsoft* Word**, **Excel**, **Access** files etc. into **PDF** format files.

Creating a PDF file for SURPAC Printed Pages :-

SURPAC has always had the facility of printing calculation pages to either a physical printer, or to a "virtual" printer. Virtual printer pages can be loaded and printed through any text printing software, such as **WordPad**, etc.

Regardless of which printing method is used, **SURPAC** also keeps a back up record of all "printed" pages. These are the pages that can be viewed in the "**Current File Printed Pages**" form, shown at the top right of the **SURPAC** screen.

Unless paper copies of calculation pages are specifically required, physical printing is not really necessary. Once the survey has been completed, all printed calculation pages (to a physical printer, the virtual printer or both) can be combined into a single, multi-page **PDF** document. To create a **PDF** file of all printed pages do the following :-

- Via the ***Windows*** Control Panel (or any other route) set the **PDF** "printer" as the Default printer.
- Click on the **SURPAC** menu heading "**File**" and then select the menu item "**Printer Set Up (for calculations)**" to verify that the **PDF** printer is set for **SURPAC** printing.
- Right-click on the **SURPAC Current File Printed Pages** form and then, from the displayed pop-up menu, select the menu item "**Re-Print All Pages**".
- Before printing takes place, a small form will prompt you to set the "Number of Lines per Page". I have tested a few of the **PDF** writers available and the number of lines per A4 page seems to vary. As an example, using the Monospace 821 font and a font size of 10, the **deskPDF** uses 70 lines per page.
- The **PDF** "printer" will prompt for the required file Name and then create the **PDF** document.

New Image Manipulation Routines – All CAD Programmes

The loading, manipulating and printing of **Images** in the **SURPAC CAD** programmes have been extended and improved, as follows :-

6. Much larger Images can now be imported. For example, running ***Windows*** **Vista** on a PC having a 2GB RAM, the **General CAD** programme is able to load and use TIF or JPG images of up to 400Mb. This facilitates importing 1:10 000 orthophoto sheets, for example.
7. The positioning and scaling of non geo-referenced **Images** has been made a lot easier. Once the file has been identified, positioning and scaling the image is done by clicking on the Top Left and then Bottom Right positions required for the **Image**. Geo-referenced Images (TIF or JPG format) use the associated **TWF** text file to position and scale the Image.
8. Once positioned, the **Image** may then be **Moved**, **Re-sized**, **Re-scaled**, **Shifted**, **Flipped** or **Deleted** at any future time.
9. For **Cadastral CAD** Sheets such as **Diagrams**, **General Plans**, **Working Plans** and **Sectional Title Plans**, a security feature has been added when adding an **Image** to the Sheet. With reference to the **MML** mentioned on the previous page, the most common **Image** likely to be used on these **CAD** Sheets would be the responsible Land Surveyor's scanned signature.

   Hence this security feature requires that a Password be entered before an **Image** can be added to the Sheet. The default Password is **ABCD1234** and it is advisable that the responsible Land Surveyor sets a new Password to ensure that only he/she can add an **Image**/signature to the Sheet.

Summary on Importing (Adding) Images to a CAD Sheet

SURPAC CAD programmes are able to import, create, export and manipulate Images of the following file types :-

BitMap (*.bmp)
JPEG Files (*.jpg)
TIF Files (*.tif and *.tiff)
GIF Files (*.GIF)
Icons (*.ICO)
Standard Metafiles (*.WMF) (Clip art images)

Enhanced Metafiles (*EMF)

When a **SURPAC CAD** programme imports an **Image**, it creates a copy of this image and stores this copy as a part of the sheet information. The original Image file is never changed by any subsequent Sheet Image manipulation in **SURPAC**.

All **SURPAC CAD** programmes have the ability to both **Import** and **Export** graphic images using parameters from associated **TIFF World Files** (***.TFW**). These small text files, which may be attached to Image files of any type, contain parameters that are used to automatically position, rotate and scale the **Image** on the Sheet, or plan, into which it is imported. This saves a lot of User time normally spent on ensuring that an imported graphic image is correctly situated on the sheet, or plan.

The information stored in a **TFW** file does not constitute complete geographical positioning, and you still need to ensure that the [**Y**, **X**] (or [**E**, **N**]) co-ordinates in the **TFW** file relate to the **Projection** and **System** of the current **Co-ordinate File** (RSA WG 27°, for example).

The **TFW** file must have the same name as its associated **TIF**, **TIFF** or **JPG** image file, in order for this function to operate.

Selecting an Image for inclusion on a CAD Sheet

When selecting the **Add (Import) a Sheet Image** menu item from the **Image** Menu bar heading, a form will be displayed allowing you to select a required **Drive** and **Folder**. All existing **Images**, of the supported types, will be listed for a defined Drive and Folder. A single mouse Click on any of the listed **Images** will display that **Image** on the right hand side of the form.

Once the required **Image** has been highlighted, click the **[Select Current Image]** button at the bottom of the form. This will select the **Image** for placement on the current Sheet.

For an image having an associated **TIFF World File**, no file positioning is required, as the elements of the **TWF** will locate and size the image automatically.

Once selection of a non-**TIFF World File** Image file is complete, move the Cursor to the required **Top Left** corner position for the Sheet Image, and click the Mouse [LHB]. Now move the Cursor to the required **Bottom Right** position for the new Sheet Image, then click the Mouse [RHB].

The Sheet Image will be displayed in the rectangle created above. This need only be a preliminary positioning and sizing of the Image. Using the other Sheet **Image** Commands, this **Image** may be **Moved**, **Resized**, **Rescaled**, **Shifted**, **Flipped** or **Deleted** at any future time.

For **Images** that have known co-ordinate values for its Top Left and Bottom Right corners, these positions can be pre-entered in the Co-ordinate file and then used to accurately position and scale the added **Image**.

New WGS 84 Trig. Beacon and TSM Data

The **WGS 84** control data base in **SURPAC** has been completely revised. The complete list of all the 2005 values of Trig. Beacons and TSMs, which are the latest available, have been incorporated in the revised data base. This new data base has been included in this **SURPAC** Upgrade and will automatically install itself in the **SURPAC** installation folder.

Apart from the inclusion of the usual **Name**, **Y**, **X**, **Z** data for the Trig. Beacons, their **Descriptive Names** have also been included in the data base. Hence, in the WGS 84 System the "**Locate and Add Nearest Trig/TSM Beacons**" programme will display the Descriptive Names of the Trig. Beacons. If either **Point Label Field #1** or **Point Label Field #2** has been pre-set to "**Trig. Names**" (in the "**Co-ordinate File Editing**" programme), then when the Trig. Beacons are imported, their Descriptive Names will be included.

For existing WGS 84 System Co-ordinate files that already contain Trig. Beacons, the **Trig. Beacons** Descriptive Names may be added by clicking on the **Co-ordinate File Editing** System heading and setting either **Point Label Field #1**, or **Point Label Field #2** to "**Trig. Names**".

New Total Stations Supported by SURPAC

Two new instruments have been added to list of Total Stations supported by **SURPAC** for the direct downloading of both **Observations** and **Co-ordinates**. These are :-

The Topcon GPT-3100 Series

Apart from adding this instrument to the list of supported Total Stations, modifications have also been made to **SURPAC** to allow support for **Mining** underground observations taken using the **VI Instruments**' **TopComm** format for the fixing of Pegs, using either the **Double Set Up** or **Double Button** methods.

The Pentax W-825NX Series

At this stage, the uploading (i.e. **SURPAC** to Instrument) of co-ordinate data is not supported.

General SURPAC Modifications

SURPAC On-Line License Security checking

The validation of **SURPAC** Licenses is now carried out by verifying the User License against a data base located on the Internet. The advantage of this method is that any de-registered License can be quickly re-instated by simply updating the internet data base. When your computer is off-line, **SURPAC** will use its internal data base to validate the License.

Those Users whose IT Department have de-activated employee Internet access, might find that **SURPAC** "freezes" when it attempts to access the on-line data base. If this does happen, please contact me for a solution to this problem.

Contour CAD Programme

This programme was not correctly creating 3D values when generating a **DXF** or **DWG** file. This has now been rectified.

Mining Peg Calculation – Double button Method

This programme was not printing the correct heading for a **Double Button** Peg Fix. This has now been rectified.

General Plan and Working Plans programmes – Delete Text group by Attributes

This function was not working correctly in either of the **CAD** programmes. This has now been corrected.

Support for Zambia – Lo System (Arc 1950)

This System has been added to the list of supported **Lo** (Clarke 1880 Modified) Systems. The **UTM** System, also used in Zambia, is already supported.

New – Functions for Interfacing SURPAC with Google Earth

As most people are well aware, the **Google Earth** application is available as a free download from the web site **http://earth.google.com/**

Google Earth allows for the viewing of 2D or 3D colour satellite imagery for any point on the Earth, as well as being able to view galaxies and the ocean floors. The surface terrain imagery can usually be viewed at a scale in the region of 1:2500 without any loss of detail quality. This figure can vary from region to region, but it is generally true for built up areas.

Google Earth, therefore, makes a vary useful visual display tool for **SURPAC** Users when it is interfaced, or linked, with survey co-ordinate and/or image data. This interfacing can be in the form of :-

Displaying the locations of Trig. Beacons and/or Town Survey Marks for a User selected area.
Displaying Beacons and Stations from a previous survey to help locate these points.
Displaying User selected Points in a Co-ordinate file to help locate these points.
Displaying Points and/or Lines from a survey plan, or sheet, to view their positions.
Displaying a survey plan, or sheet, itself as an overlay image on the earth surface, etc.

SURPAC Version 5.35 now has the above interface options included which are described below.

Requirements to enable SURPAC interfacing with Google Earth

1. **Google Earth** must be installed on the computer. If you do not already have **Google Earth** installed, visit **http://earth.google.com/** and follow the on-screen instructions for installing this software. The basic version of **Google Earth** is free and is quite suitable for the **SURPAC** interface functions mentioned below. There is a **Google Earth Pro** version available, but at a cost of US$400 (about R4000).
2. The currently loaded **Co-ordinate file** in **SURPAC** must use either the **WGS 84** ellipsoid, the **GRS80** ellipsoid or any other ellipsoid having the same parameters as the **WGS 84** ellipsoid.
3. A reasonably fast **ADSL** or **3G** wireless internet connection.

Optional Setting the Google Earth Display of SURPAC Data and Overlays

1. The **SURPAC** data displayed on **Google Earth** does not always provide an exact visual fit on to the satellite imagery. In order to force the displayed data to fit as close as possible to the imagery, you can use the **Google Earth** "**Measure**" tool to determine the **Y**, **X** (or **E**, **N**) shifts to be applied to the **SURPAC** data, or image, so that it best fits the imagery.
2. A plan, or sheet, that is displayed on **Google Earth** as an overlay can have varying levels of transparency applied to it. Increasing an overlay's transparency allows more of the imagery lying under the overlay to become visible. Setting a zero transparency will allow the overlay to completely hide the underlying imagery. Note that on **Google Earth** itself there is a "slide" option (on the **Sidebar** information display) that allows for further refinement of the overlay's transparency level.
3. An overlay of a plan, or sheet, may also be viewed whereby the sheet background is completely transparent, i.e. only the detail on the sheet, such as the lines, text, hatching etc. will be displayed. For this option to apply, the sheet background colour has to be white, which is the case for all **SURPAC CAD** sheets.

All **SURPAC CAD** programmes which use the **Google Earth** display function have a menu item whereby the **Google Earth** display option can be set or viewed. The options may also be set by clicking the **[File options]** button when in the "**Co-ordinate File Editing**" programme.

Displaying the "Locate and Add Nearest Trig/TSM Beacons" beacons on Google Earth

2 First, run the **"Locate and Add Nearest Trig/TSM Beacons"** programme from the **"Conversions"** main menu heading *(if your **SURPAC** License has this Module)*.

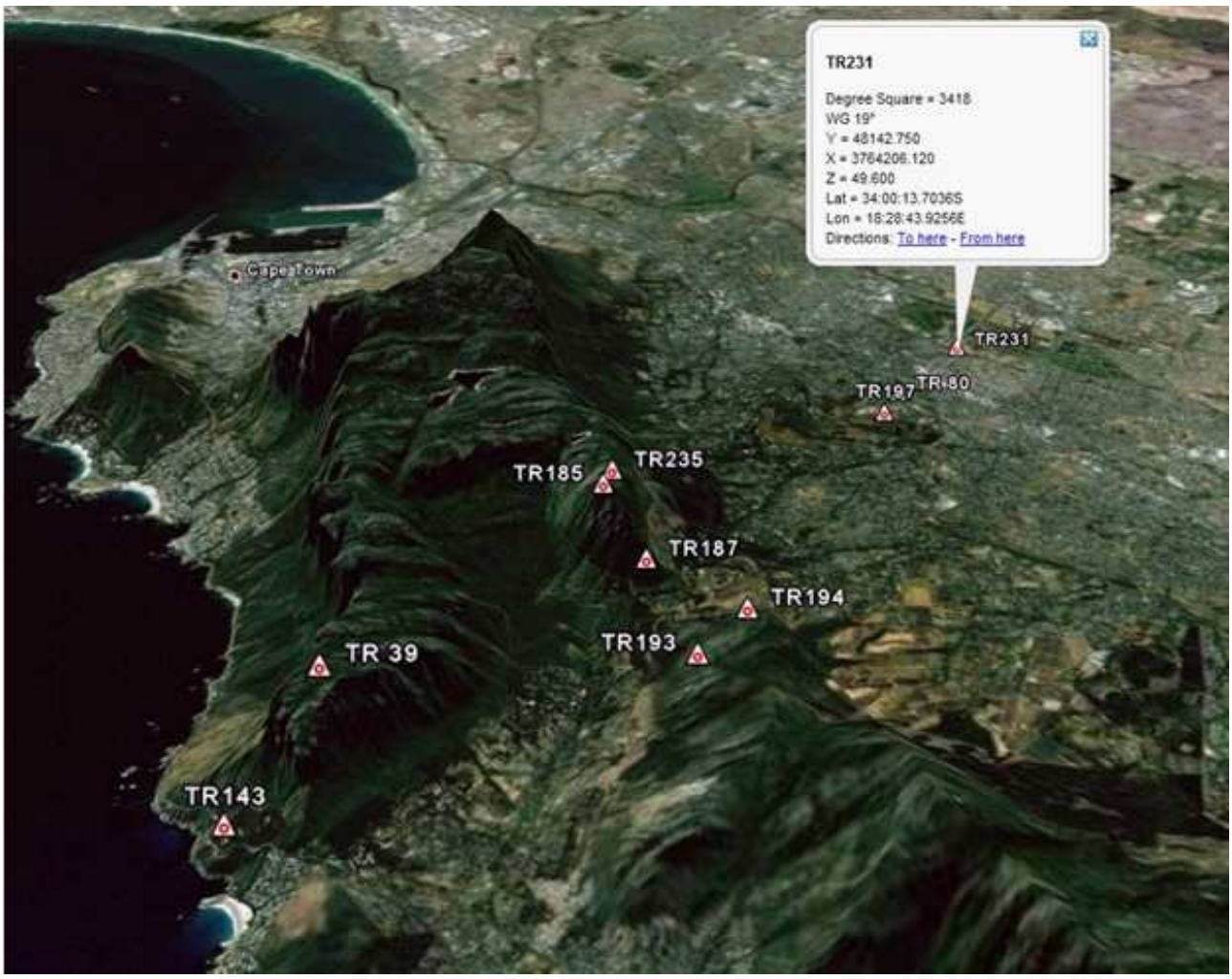
3 Set the search options at the bottom of the form so as to display the required number and type of beacons.

4 From the displayed list of beacons, remove any unwanted beacons by clicking on the green tic shown at the end of each display line. The green tic will change to a red cross. This point will remain "dormant" and will not be displayed until clicked again.

5 Click on the **[View List on Google Earth]** button at the bottom right of the form.

SURPAC will open and run **Google Earth** and the selected beacons will be displayed at their surface positions on the satellite imagery. Either a **Trig**. **Beacon** or a **TSM** symbol (icon) will be used to mark the displayed beacons. To obtain a beacon's information, click on the beacon required. A balloon text display will then appear showing :-

The Beacon Name
The Degree Square (Trig Beacons only)
The Co-ordinate System (e.g. WG29°)
The Beacon Y, X and Z values (or E, N and H values)
The Beacon Latitude and Longitude



Example of a 3D View of Trig Beacons displayed on Google Earth

Displaying selected Points from the Co-ordinate File on Google Earth

1. First, run the **"Co-ordinate File Editing" programme** from the **"General"** main menu heading.
2. **Mark** (i.e. highlight) the Points required for viewing on **Google Earth**.
    a. *You can **mark a block of Points** by either clicking on the first Point in the block and then dragging the cursor onto the last Point, or by clicking on the first Point in the block then holding down the **Shift** key and simultaneously clicking on the last Point in the block.*
    b. *You can **mark individual Points** by clicking on the first required Point and then, whilst holding down the **Ctrl** key, click on any other required Points.*
    c. *You can **mark Points by Description** by clicking on the **[File Options]** button and then selecting the **"Select Points to be Highlighted (by Description)"** option and then selecting the required Descriptions from the displayed list.*
3. After selection, Click the **[Google Earth]** button on the **Actions Bar** menu.

The Points selected will be displayed at their surface positions on the satellite imagery by **Google Earth**. Either a **Point**, a **Trig**. **Beacon** or a **TSM** symbol (icon) will be used to mark the displayed Points, as is appropriate. To obtain a Point's information, click on the Point required. A balloon text display will appear showing :-

The Point Name
The Point Description
The Co-ordinate System (e.g. WG29°)
The Beacon Y, X and Z values (or E, N and H values)
The Beacon Latitude and Longitude

Interfacing SURPAC CAD programmes with Google Earth

These functions apply to the **General CAD**, **Contour CAD**, **General Plan CAD**, **Sectional Title CAD** and **Working Plan CAD** programmes.

Note that the **Contour CAD** programme only has the **"Viewing a SURPAC CAD Sheet on Google Earth "** option available.

Viewing a SURPAC CAD Sheet's Lines and Points on Google Earth

Note :-
*Before proceeding, view and/or reset the **Google Earth** options in **SURPAC** (see above).*

*If the **Point Display** option is **On**, then only the Points that have been Named (by using the **[PN]** Command) will be displayed on the **Google Earth** overlay.*

*All **Lines** will be shown in **red**. Colours such as black, green and blue do not show clearly when transferred to **Google Earth**.*

*All Points will be marked by either the **SURPAC** Point marker or, in the case of Trig. Beacons and TSMs, the appropriate control point symbol.*

1. In the **CAD** programme, click on the "**File**" main menu heading and then select the **"View Lines and Points on Google Earth"** menu item. (Note :- *If the **Point Display** has been turned **Off**, then this menu item will read **"View Lines on Google Earth")***.
2. Once the **CAD** sheet Line and Point data have been transferred, **Google Earth** will shift its location to the centre of the imagery covered by the data and will display the data viewed from an appropriate height. The **Orientation** is set to North and there is no **Tilt** applied. All viewing settings can be User modified from within **Google Earth**. Clicking on a displayed Point will show a text balloon containing the Point's values and information.

Example of a new township layout, showing Lines and Named Points, on Google Earth

Viewing a SURPAC CAD Sheet on Google Earth

Notes :-

*Before proceeding, view and/or reset the **Google Earth** options (see above).*

*One problem associated with using a **CAD** Sheet as an overlay is that of the **Meridian Convergence**. Since a **CAD** Sheet is always oriented to **Grid North** (the **True North** at the Central Meridian of the projection) and not to **True North** at the Sheet position, **SURPAC** has to swing the **CAD** Sheet display so as to re-orient it to True North.*

*Before the image of a **CAD** Sheet is sent to **Google Earth** as an overlay, you will notice it being re-drawn in **SURPAC**. This is to both re-orient the Sheet for **Meridian Convergence**, as explained above, and to set the Sheet scale to the defined plotting scale. This latter action is too ensure a clearer Sheet image on **Google Earth**. For the **Windows Vista** operating system (which has better graphic memory handling), the scale is set to half the defined plotting scale to provide an even clearer overlay image.*

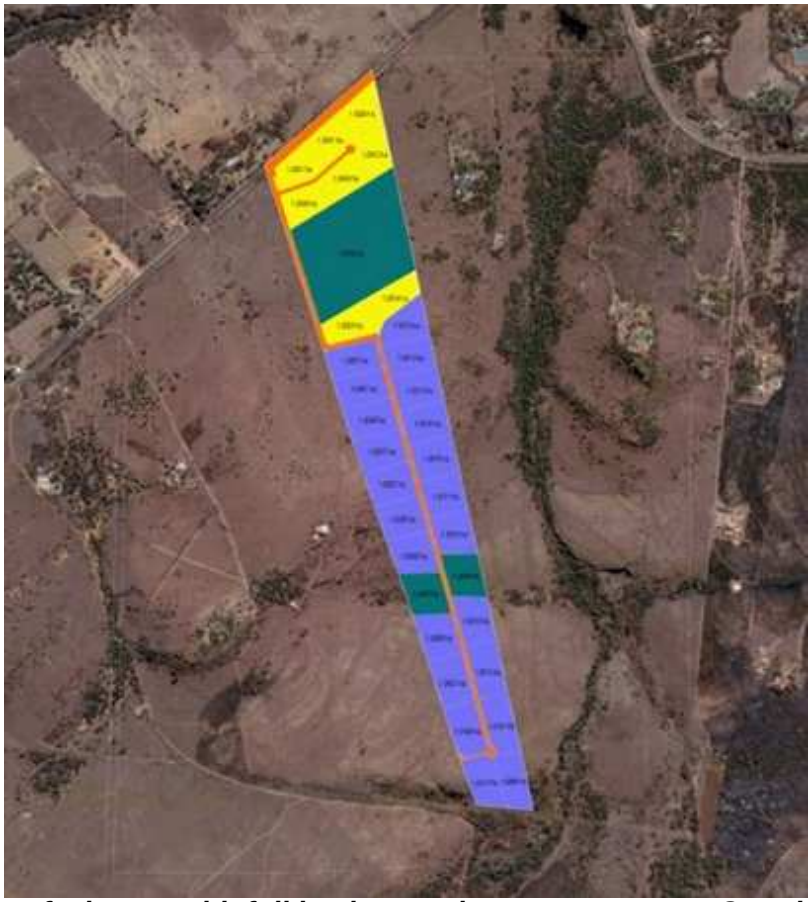
1. In the **CAD** programme, click on the "**File**" main menu heading and then select the **"View Sheet on Google Earth"** menu item.
2. Once the **CAD** sheet has been transferred, **Google Earth** will shift its location to the centre of the imagery covered by the Sheet and will display the Sheet viewed from an appropriate height.

Notes :-

*The Sheet **Orientation** is set to True North (regardless of the Sheet Swing used) and there is no **Tilt** applied. All view settings can be User modified from within **Google Earth**.*

*The Sheet overlay will be "locked" to the terrain covered by the Sheet. Hence, when viewed in **3D**, the Sheet will drape itself over the terrain, much like a table cloth laid over a piece of rocky ground. If the Sheet background has been set as fully transparent (see **Google Earth Options**), then only the Sheet data, such as Lines, Text, Hatching etc .will be shown. Otherwise, the **Slide** on the **Google Earth Sidebar** can be used to change the Sheet overlay transparency.*

Example of a SURPAC Township layout Sheet, with partial transparency, on Google Earth



Example of a layout with full background transparency, on Google Earth

Example of a 3D semi-transparent CAD Sheet Overlay, plus Trigs on Google Earth

File type used for Interfacing SURPAC with Google Earth

Interfacing with **Google Earth** is done via **KML** files (Keyhole Markup Language). **KML** files employ HTML/XML type grammar and may be used for modelling and storing geographic features such as points, lines, images, polygons and models for display in **Google Earth**, Google Maps, ESRI ArcGIS Explorer, AutoCAD etc.

Once you have defined which elements (points, lines, map sheets etc.) you want displayed on **Google Earth**, **SURPAC** will transform the **Y**, **X** (or **E**, **N**) positional information into **Latitudes** and **Longitudes**. **SURPAC** will also convert dotted or dashed lines into small line segments for sending to **Google Earth**, as the **KML** format can only handle solid lines.

If a **SURPAC CAD** sheet is to be sent to **Google Earth**, **SURPAC** will first set the sheet transparency, or set the background to fully transparent (as User set) and then create a **PNG** image of the sheet. *(**PNG** (Portable Network Graphics) files are lossless, highly compressed image files, normally having the extension of .png.)*

All **SURPAC** generated **KML** and **PNG** files are stored in the folder **"C:\Surpac_GE"**. The names of the generated **KML** files (and of the associated **PNG** files, where applicable) are :-

KML files saved from the **"Locate and Add Nearest Trig/TSM Beacons"** programme are called ***FileName_Trigs.kml***, where ***FileName*** is the name of the current **Co-ordinate** file.

KML files saved from the **"Co-ordinate File Editing"** programme are called ***PointName_Point_Group.kml***, where ***PointName*** is the name of the first Point selected (marked) in the current **Co-ordinate** file.

KML files saved for Lines and Points from the **"General CAD"** programme are called ***FileName_CAD_Lines.kml***, where ***FileName*** is the name of the current **Co-ordinate** file.

KML and **PNG** files saved for Sheet overlays from the **"General CAD"** programme are called ***FileName_CAD_Sheet.kml*** and ***FileName_CAD_Sheet.png***, where ***FileName*** is the name of the current **Co-ordinate** file.

KML files saved for Lines and Points from the **"General Plan"** programme are called ***FileName_GP_SheetX_Lines.kml***, where ***FileName*** is the name of the current **Co-ordinate** file and ***X*** is the current **GP** Sheet number.

KML and **PNG** files saved for Sheet overlays from the **"General Plan"** programme are called ***FileName_GP_SheetX.kml*** and ***FileName_GP_SheetX.png***, where ***FileName*** is the name of the current **Co-ordinate** file and ***X*** is the current **GP** Sheet number.

KML files saved for Lines and Points from the **"Working Plan"** programme are called ***FileName_WP_SheetX_Lines.kml***, where ***FileName*** is the name of the current **Co-ordinate** file and ***X*** is the current **WP** Sheet number.

KML and **PNG** files saved for Sheet overlays from the **"Working Plan"** programme are called ***FileName_WP_SheetX.kml*** and ***FileName_WP_SheetX.png***, where ***FileName*** is the name of the current **Co-ordinate** file and ***X*** is the current **WP** Sheet number.

KML and **PNG** files saved for Sheet overlays from the **"Contour CAD"** programme are called ***FileName_Contour_Sheet.kml*** and ***FileName_Contour_Sheet.png,*** where ***FileName*** is the name of the current **Contour** file.

Compressed (zipped) KMZ files for third party use

Another file format that can be used for sending data and overlays to **Google Earth** is the **KMZ** format. This is a zipped format of a **KML** file and is a handy format when sending overlay information to another person who does not have **SURPAC** Software.

To create a **KMZ** file from a **SURPAC** generated **KML** file, use any zip application, such as **Winzip**, or **WinRAR** to create a zipped file that contains all the required elements for the data and or overlay. The created zip file must be given the extension **.kmz**

Notes :-

- *For files that contain **Points**, you must include the three small **PNG** image files called **RedBlackTrig.png**, **RedBlackTSM.png** and **RedBlackPoint.png**.These images are the **SURPAC** mark icons for Trigs, TSMs and Points respectively.*
- *For overlays that consist of a **CAD** Sheet, the **PNG** image of the **CAD** Sheet must be included. The **PNG** image file will have the same name as the **KML** file.*
- *All the above files, including the **KML** file, are located in the **"C:\Surpac_GE"** folder.*

The **KMZ** file can then be sent to a third party user, with the instruction that the contents of the **KMZ** file must be extracted to a folder called **"C:\Surpac_GE"**. Unzipping (extracting) the **KMZ** file will produce the parent file with a **KML** extension, plus the mark icons, and other information linked to the **KML** file. Double clicking on the extracted **KML** file will then open **Google Earth** and produce the same data and/or overlay view as produced by **SURPAC**.

Hints when using SURPAC CAD and Google Earth interfacing

1. *If you intend to view multiple **SURPAC** data and/or overlays in **Google Earth**, then do not close **Google Earth** after each viewing. Leave **Google Earth** in the background, or minimize it, whilst you generate the next view.*
2. *If you have multiple views displayed, any of these may be temporarily removed by un-checking their display names in the **Temporary Places** section.*
3. *When you do close **Google Earth**, you will be queried as to whether you want to save the temporary view in the **My Places** section. If you want the views to be permanent, then reply "Yes", other wise they will be deleted.*

Finally, my thanks to Land Surveyor **Henlu du Preez** of Lichtenberg for first suggesting the **SURPAC** interface with **Google Earth**.

General SURPAC Modifications

SURPAC General CAD Programme

A new option has been added to the **"Topo Symbols"** menu. This is the menu item called **"Place Symbols at All Points"**.

This option allows you to select both a **Point Description** and **Topo Symbol**. The programme will then place the selected **Topo Symbol** at every Point having the selected **Point Description**.

The form also allows for selection of the **Topo Symbol** attributes, such as size, orientation, colour etc.

Displaying the Meridian Convergence for any Point in the current Co-ordinate file

When in the **"Co-ordinate File Editing"** programme, right click on any Point in the list of displayed Points. This will display a pop-up menu containing various routines and functions applicable to the Co-ordinate file. The fist item displayed on the menu will be the Point's **Meridian Convergence**.

SURPAC Version 5.35, Release 02 - Programme Modifications

Further Functions for SURPAC Interfacing with Google Earth

The following new functions have been added to **SURPAC** to improve and extend its interfacing with **Google Earth** :-

Setting the Google Earth Display Options

The following options have been added :-

Line information sent from **SURPAC** to **Google Earth** can have the following options set :-

- Users can set the **Lines** to be sent using their defined **Line Thickness** values
- Users can set the **Lines** to be sent using their defined **Line Colour** values
- If **Lines** are to be sent using a **Single Colour**, then this colour can be User defined.

Transferring a Google Earth Placemark position to a SURPAC Co-ordinate File.

Creating a Placemark in Google Earth

In **Google Earth**, ensure that the **Toolbar** and **Sidebar** are displayed. Move the **Google Earth** display to show the required area at the required scale.

To create a **Placemark**, click the appropriate toolbar icon, or select the "**Placemark**" menu item found under the "**Add**" menu heading. The new **Placemark Dialog Box** appears and the cursor changes to a flashing, square drawing tool. Enter the properties for the **Placemark** and give it an appropriate **Name**. Since **SURPAC** will use the **Placemark Name** as the name for the imported Point, use a **SURPAC** friendly name, i.e. up to 8 characters in length.

Move the cursor onto the flashing drawing tool, and then drag the tool to the required screen position, by holding down the Mouse LHB as the cursor is moved. Once the drawing tool is correctly positioned, click the [**OK**] button on the dialog box. The newly created **Placemark** will be added to **My Places**. *(**Warning**, if you have a **Temporary Place** currently open at the time of the construction, then the **Placemark** may be added to that **Temporary Place**).*

The created **Placemark** now needs to be saved as a **KML** file in order for **SURPAC** to be able to import it. To do this, locate the **Placemark** under either **My Places** or **Temporary Places** and right click on it. A pop up menu will appear and on this menu click the **Save Place as …** menu item.

On the displayed **Save file …** form, ensure that the **Save as Type** item is set to **KML (*.kml)**. The **KML** file may be saved to any folder, but **SURPAC KML** files are generally kept in the **C:\Surpac_GE** folder. Finally**,** click on the [**Save**] button.

Importing the Placemark into a SURPAC Co-ordinate File as a Point

*Before attempting to import the **Placemark** data into a **Co-ordinate** file, first ensure that the file System is set to either the **WGS 84** or **GRS80** ellipsoids and that the Central Meridian of the WG System, or Zone, is correct for the point data to be imported.*

In the **SURPAC Co-ordinate File Editing** programme, click on the [**Import GE KML**] button on the **Actions** bar menu.

From the displayed **File Selection** form, select the **KML** file that contains the required **Placemark** information. The **Placemark** position will then be converted to its equivalent **Y**, **X** (or **E**, **N**) co-ordinate values and saved into the current **Co-ordinate** file, using the **Placemark** name as the new Point name.

Transferring a Google Earth Path or Polygon to a SURPAC General CAD Sheet

Creating the Path or Polygon in Google Earth

In **Google Earth**, ensure that the **Toolbar** and **Sidebar** are displayed. Move the **Google Earth** display to show the required area at the required scale.

To create a **Polygon**, click the appropriate toolbar icon, or select either the "**Path**" or the "**Polygon**" menu item found under the "**Add**" menu heading. The new **Path** or new **Polygon Dialog Box** appears and the cursor changes to a square drawing tool. Enter the properties for your drawing and give the **Path** or **Polygon** an appropriate **Name**. You can change the style and/or colour for the line or polygon from the default white to better visualize the shape you are about to draw. You can also enter an appropriate **Name** for the **Path** or **Polygon** to be created.

Click in the viewer to start the drawing creation and use the following method to achieve the desired shape :-

Regular shape - **Click and release method**. Move the Mouse to a new point and click to add additional points. In this mode, the cursor remains a square drawing tool whilst the **Path** or **Polygon** being drawn is displayed up to the last clicked position. **Polygons** will automatically be closed back onto the defined starting position. Whilst drawing, the last clicked position can be deleted by clicking the Mouse RHB.

Once construction of the **Path** or **Polygon** is complete, click the [**OK**] button on the dialogue box. The **Path** or **Polygon** created will be added to **My Places**. *(**Warning**, if you have a **Temporary Place** currently open at the time of the construction, then the **Path** or **Polygon** will be added to that **Temporary Place**).*

The created **Path** or **Polygon** information now needs to be saved as a **KML** file in order for **SURPAC** to be able to import it. To do this, locate the **Path** or **Polygon** under either **My Places** or **Temporary Places** and right click on it. A pop up menu will appear and on this menu click the **Save Places as …** menu item.

On the displayed **Save file …** form, ensure that the **Save as Type** item is set to **KML (*.kml)**. The **KML** file may be saved to any folder, but **SURPAC KML** files are generally kept in the **C:\Surpac_GE** folder. Finally**,** click on the [**Save**] button.

Importing the Path or Polygon into a SURPAC General CAD Sheet

In the **SURPAC General CAD** programme first set the required **Pen Style**, **Colour** and **Thickness** to be used for the imported lines. Click on the **File** menu heading and then select the **Import Lines from Google Earth KML File** menu item . From the displayed **File Selection** form, select the required **KML** file. The **Lines** contained in the selected **KML** file will be imported and displayed on the current Sheet, using the defined Style, Colour and Thickness.

Transferring a Google Earth Image to a SURPAC General CAD Sheet

Creating a bounding Polygon and defining an Image in Google Earth

In **Google Earth**, ensure that the **Toolbar** and **Sidebar** (found in the **Layers Panel**) are displayed. Move the **Google Earth** display to show the required area at the required scale.

On the **Sidebar** set the **Terrain** option to **OFF**. *(This is important. If **Google Earth** is viewed using the **Terrain** option, images become distorted due to terrain height differences.)*

Use the **Navigation Control** (displayed at the top right corner of the **Google Earth** display) to set the orientation to **True North** (click the **N** symbol at the top of the **Navigation Control**). *(This is important. If **Google Earth** is not viewed in **True North** orientation, the image will be distorted when sent to **SURPAC**.)*

Now create a **Polygon** (as described above), by carefully clicking on the four corners of the **Google Earth** display area. The **Polygon** created should show four lines running around the outside edge of the displayed image (i.e. the image to be saved).

NB : *If the **Polygon** is displayed as a solid figure instead of the four boundary lines, click the [**Style, Color**] tab of the **Polygon Dialog Box** and change the **Area Color** to **Outlined**.*

Save this **Polygon** as a **KML** file (as described above), normally into the **C:\Surpac_GE** folder.

NB : *After creating and saving this **Polygon**, it is important that the **Google Earth** display is not changed in any way until the current image has been saved.*

Click on **Google Earth**'s **File** menu heading, then select the **Save** menu item and then the **Save Image** sub-menu item. In the **Save As** dialogue box, enter an appropriate file **Name**. The file type is automatically set to the Jpeg format. Save the file in the same folder as the associated **Polygon** (normally the **C:\Surpac_GE** folder).

NB : *The **Google Earth Pro** application is able to create image files at a much higher resolution than the standard **Google Earth**. However, the **Pro** version is not free and costs about US$400.*

Importing the Google Earth Image to a SURPAC General CAD Sheet

In the **SURPAC General CAD** programme ensure that the sheet size and scale are correct for the **Image** to be imported. Then import the **Image** bounding lines via the **Polygon KML** file created above, defining the **Image** size and position (see above) by using the **Import Lines from Google Earth KML File** menu item.

NB : *With the Sheet orientation set to 0° the imported **Polygon** should appear to be slightly tilted due to the effect of Meridian Convergence (see below). The **Polygon** should not appear to be trapezoidal in shape, or to be distorted. This would indicate that the **Google Earth** was **tilted** and/or the **Terrain** option was still ON.*

On the Sheet, locate the cursor at the approximate centre of the **Polygon**, then click the Mouse RHB. Click the **Image** menu heading and then select the **Add (Import) a Sheet Image** menu item. On the **Image Selection** form, set the required path and then click on the required **Image** file. On the right hand side of the form *deselect* **the Maintain the Image Width and Height Ratio** option and *select* the **Apply Meridian Convergence to Image** option.

NB : *This last option is important as it is necessary for **SURPAC** to apply a small rotation to the incoming **Image** to compensate for **Meridian Convergence**. This due to the **Google Earth Image** being oriented to **True North** and the **SURPAC** Image being oriented to the **Grid North** (i.e. the True North at the central meridian).*

The Sheet will automatically be re-oriented by the amount of the Meridian Convergence. On the **SURPAC General CAD Sheet**, move the cursor to the top left corner defined by the imported **Polygon** and then click the Mouse LHB. Now move the cursor to the bottom right corner of the **Polygon** and then click the Mouse RHB.

SURPAC will now apply a swing to the **Image** to correct for the Meridian Convergence. The Sheet will again re-orientate back to 0° and display the adjusted imported **Image**.

NB : *The **Image** will no longer fit perfectly onto the **Polygon** lines due to the former having been swung to compensate for the Meridian Convergence*

Adjusting the Imported Sheet Image

Setting the Image to the Background – If the **Image** lies on top of existing Line and Text items then set the Image as the background, i.e. the Lines, Text, Points etc. will be displayed on top of the **Image**. To do this, right Click on the **Image**, click the **Image** menu heading and then select the menu item **Send Images to the Back**.

Shifting the Image - The imported **Image** may need to be shifted in the **Y** and/or **X** directions to get a good fit with any existing Sheet data. If this is required, right Click on the **Image**, click the **Image** menu heading and then select the **Shift a Sheet Image** menu

option. On the displayed form, enter the **Y** and/or **X** movement required for the **Image**. This option can be repeated to ensure a good fit.

Adjusting the Image Brightness and/or Contrast – **Images** required for background information may need their brightness and/or contrast adjusted to avoid the **Images** interfering with the display of Lines and Text. To do this, right Click on the **Image**, click the **Image** menu heading and then select either of the **Adjust Image Brightness** or the **Adjust Image Contrast** menu options. On the displayed form, use the slide bars to set the required brightness and contrast values.

SURPAC Version 5.35, Release 03 - Programme Modifications

Microsoft **Windows 7 Operating System**

As most Users are now aware, ***Microsoft*** has officially launched its new operating system called **Windows 7**. As with earlier systems, **Windows 7** comes in various flavours such as “Home”, “Home Premium”, “Professional” and “Ultimate”. These editions are also available in either 32 bit or 64 bit format

I have tested **SURPAC** for both installation and operation on **Windows 7** “Home Premium” 32 bit and I am pleased to report that no problems were encountered.

If you have a **SURPAC for Windows XP/Vista** installation CD, then this may be used to install **SURPAC** on **Windows 7**, as long as the same installation method used for **Windows Vista** is followed.

New installation CDs are available for installing on **Windows XP/Vista/7**, which allow direct installation without the need to follow specific steps for **Windows Vista** or **Windows 7**. A new installation CD costs R150.00 (to cover costs and courier fees) for Users having a current **SURPAC** Maintenance Contract.

Point Comparison using different Files

A new option has been added to this programme. It is now possible to compare Point **Co-ordinates** and **Heights** (the default option) between two files, or to compare Point **Descriptions** between two files.

Diagram Programme

4. The size of the text “Surveyor General” on Sheet 2 of an A3 Diagram has been changed to match that on Sheet 1.
5. The Bezier (Spline) curve function has been improved.
    a. When a figure was oriented, the Bezier curve was not plotting in the correct position. This has now been rectified.
    b. The Bezier curve was also causing an approximate 200mm shift in the position of Text items. This has now been fixed.
    c. Please note that Bezier curves can only be created when the figure orientation is 0˚. After creation of the Bezier curve, the figure may then be re-oriented.
6. A Diagram can take up to 200 Excluded, or Servitude points.
7. The Diagram headings, such as “Sides” and “Directions”, were sometimes being deleted when other text items were deleted. This has been fixed.

Locate and Add Nearest Trig/TSM Beacons

1. The **SURPAC** Trig data base for the **Hartebeeshoek94** (WG) system, issued in June this year, inadvertently had areas in the Western Cape missing. This **SURPAC** Upgrade includes an amended data base that now has all areas covered.
2. There was a problem when sorting a displayed list of nearest Trig. Beacons. When changing the display form “Distance to “Direction” or “Name”, the names of the Trig. Beacons were not being sorted correctly. This has now been rectified.

Point Off-Line Calculations

When **Moving Points On-Line**, the programme was not re-storing the moved Points. This has now been corrected.

General Plan, Section Title and Working Plan Programmes

A new option has been included in these programmes that allows for the **Deletion of User Selected Sheets**. This option can be found by clicking the programme's "**File**" menu heading and then selecting the menu item "**Delete Selected …… Plan Sheets**".

The programme will then display a list of the existing Sheets. Select (tic) the Sheets required to be **Deleted** and then click the [**Proceed**] button.

Google Earth Version 5.1

For some reason know only to the **Google** boffins, the newest version of **Google Earth** installs itself in a different folder location than that of previous versions. This had the effect of making this version of **Google Earth** "invisible" to **SURPAC**. The new location for **Google Earth** has now been added to path search in this latest version of **SURPAC**.

Importing Polygons from Google Earth Into the General CAD Programme)

Previously, the maximum number of sides for an imported **Google Earth** Polygon was set at 100. This has now been extended to 5,000 which should cover most User requirements.

Least Squares – Single Point Fix

When an **Observation line** contained both a **Horizontal Angle** and a **Slope Distance**, the programme was not making provision for the case where the **Horizontal Angle** was deleted and only the **Slope Distance** was required to be used. This has now been rectified.

Vertical Curve Alignment Programme

There was a "bug" in this programme which sometimes caused the display of an incorrect **K-factor** value in the Curve Alignment Set Up display. This has now been corrected.

Printing the Co-ordinate File listing to an ASCII file

When printing a Co-ordinate File listing to an **ASCII** file by using either the [**Print File**] icon or the "**Print the Co-ordinate File List**" menu option from the Pop-Up menu (when using the Co-ordinate File Editing programme), an error message was displayed and the ASCII file was not created. This problem has now been fixed.

Selecting a Printer for Calculation Printing

You may now select any installed Printer device for printing calculations, without changing the Windows Default printer setting.

From the top "**File**" main menu heading, click the menu item "**Printer Select and Set Up (for Calculations)**". The **Printer Set Up** form will be displayed and the Windows Default Printer will be shown as the **Current Printer**. Next to this item is a new button, [**Select**]. Click this button and select the required **Printer** from the displayed list of available **Printers**.

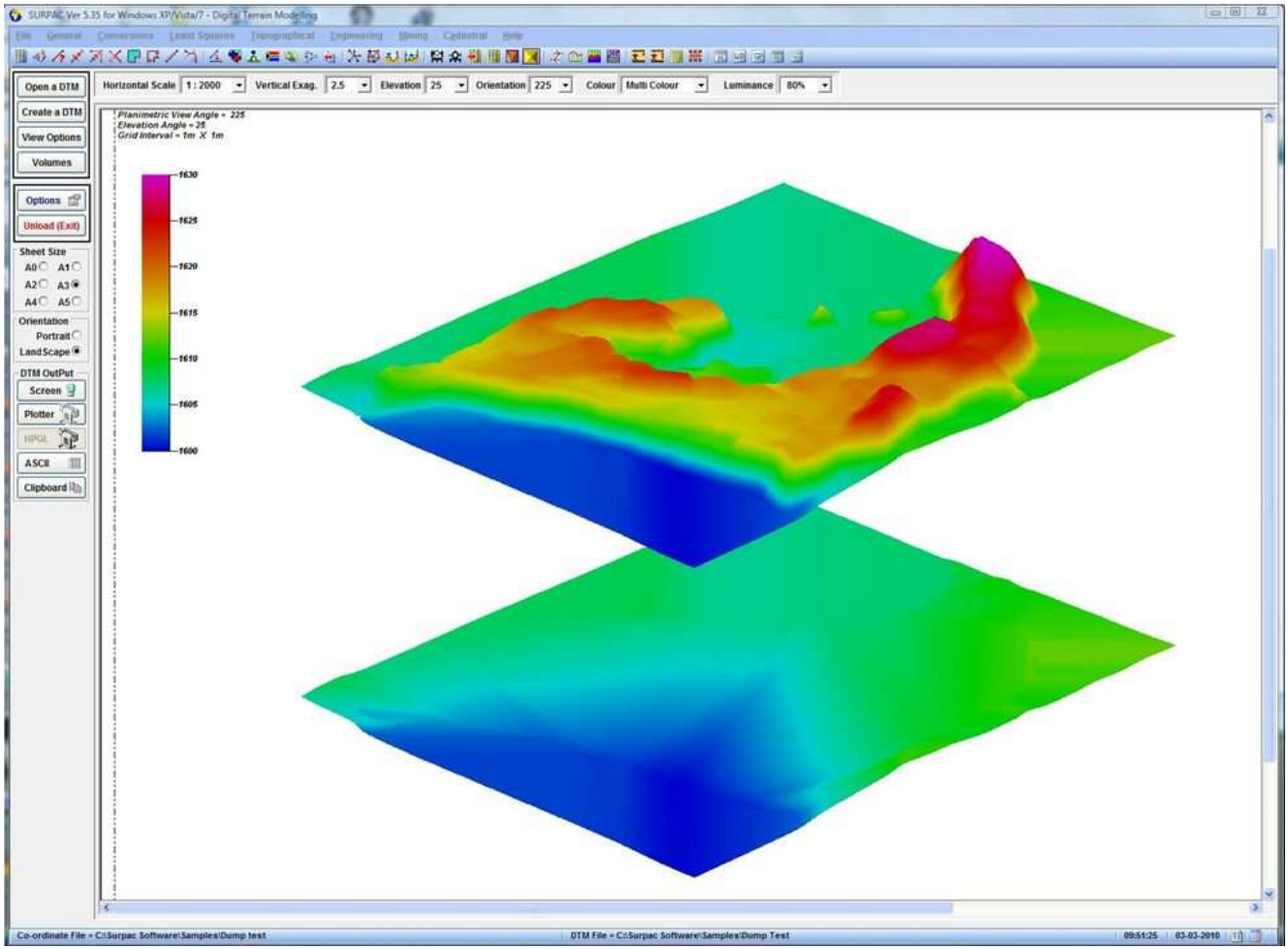
The selected **Printer** will remain as the **Calculation Printer** device for the duration of the current **SURPAC** session, or until it is again changed by the User.

SURPAC Version 5.35, Release 04 - Programme Modifications

Modifications to the DTM Creation/Display Programme

The **DTM** (Digital Terrain Modelling) Programme has been improved, with the following changes :-

1. The **Multi-Colour** display for both the **Grid Mesh** and **Solid Model** displays has been modified to display a uniform PROYGB colour display, with blue being the colour depicting the lowest regions and purple depicting the highest regions. The **Multi-Colour** display is now set as the default display value, as its use of colour layers gives a better visual impression of the model.
2. A **Colour Height Bar** is shown on the left of the sheet. This bar shows the actual height values relative to the different colours used on the display.
3. When both a **Figural DTM** and a **Base DTM** exist for a model, it is now possible to view the two surfaces either simultaneously, or individually when viewing a **Solid Model**.
4. The Vertical Scale value has been removed and replaced with a **Vertical Exaggeration** setting. Now, when you change the **Horizontal Scale** of a display the **Vertical Exaggeration** value will remain constant, and does not need to be re-set for every change of scale.
5. The **Luminance** of a model display can now be varied from 50% up to 100%. This is basically a colour saturation control and can be so as to best suit the display of the model.



A DTM model showing both the Base DTM and Figural DTM on the same display

Least Squares Network Plotting of Observations and Error Ellipses

After computing a **Least Squares Network Adjustment** programme, it is now possible to view and/or plot a sheet showing the Observed **Directions** and Measured **Distances** used in the network, along with the network **Points** and their associated **Error EllipseS**. This feature is also available for The **Least Squares Single Point Fix** routines in **SURPAC**.

The display of **Distances** and **Directions** follows the normal survey conventions, i.e. :-

Measured **Distances** are displayed in **red**. If the line is measured in both directions, two red lines will be shown. Observed **Direction** are displayed in **black**. When a **Direction** is observed one way only, the line will be shown as a two thirds solid line and a one third dotted line. When directions are observed both ways a solid black line will be shown.

Programme Features

After computing the **Network** (or **single Point Fix**) the results of the Least Squares Adjustment will be displayed on the output sheet. At the foot of the sheet will be a series of option buttons and the [**Plot Network**] button is the third button from the left. Clicking this button will produce a default display of the Network on an **A3** sheet. This default display can now be modified using the options as outlined below.

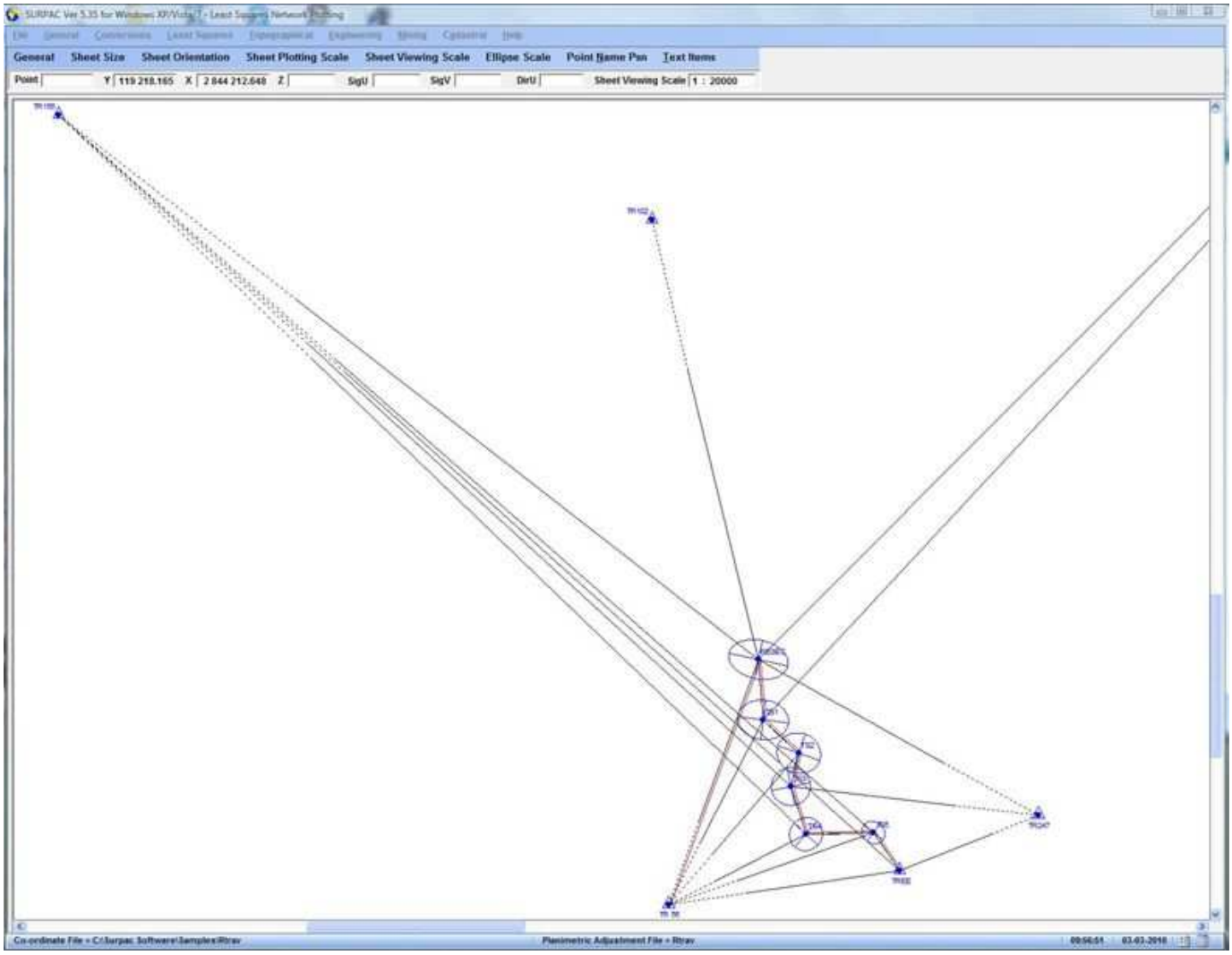
Options using the Menu system

- **Refresh the Display** : You can re-display the Sheet with the current cursor position as the sheet centre. (You can also use the [**F2**] SFK to do this).
- **Select a New Sheet Swing** : The Sheet display may be swung (re-oriented) from -90° to +90°. (You can also use the [**F4**] SFK to do this).
- **Select an New Sheet Centre** : The position of the Network on the selected Sheet can be adjusted by re-setting the [**Y**, **X**] (or [**E**, **N**]) values for the Sheet Centre. When this option is selected, the current Sheet Centre will be displayed by means of a blue cross.
- **Display Point Information** : This option will display a Network **Point**'s, **Name**, **Co-ordinates** and **Error Ellipse** parameters (if the Point has been adjusted in the Network) in the information bar near the top of the screen.
- **Plotter Output** : If a hard copy (or PDF) output of the Sheet is required, then select this option. The existing Plot Scale, Error Ellipse Scale etc. will be used for the plot output.
- **Sheet Size** : You may select a Sheet Size that allows for the display of the network data, without congestion
- **Sheet Orientation** : The Sheet Orientation (not the Sheet Swing) may be set to either **Portrait** or **Landscape** modes.
- **Sheet Plotting Scale** : The Plotting Scale should be used in conjunction with the Sheet Size and Sheet Orientation to produce a plot of the network without congestion.
- **Sheet Viewing Scale** : The Viewing Scale can be set to display any portion of the Sheet on the monitor. (You can also use the [**F5**] SFK or the Mouse **Scroll** button to do this).
- **Error Ellipse Scale** : The Error ellipse Scale should be set to suite the accuracy of the network and the Sheet Plotting Scale. For example, If an Error ellipse Scale of 1 : 1 is set, then at the defined Plotting Scale, the semi-axes major will plot true to scale.
- **Point Name Positions** : You may set, or reset, the position of **Point Names** by using the normal **SURPAC N1** – **N9** Commands.
- **Text Items** can **Written**, **Imported**, **Edited**, **Moved** and/or **Deleted** using the normal **SURPAC Text** Commands.

Options using the Mouse

- **Clicking the Left Hand Button** : If the **LHB** is clicked on, or close to a Network **Point**, the Point's **Name**, **Co-ordinates** and **Error Ellipse** parameters (if the Point has been adjusted in the Network) will be shown in the information bar near the top of the screen.

- **Dragging the Left Hand Button** : Holding down the **LHB** and moving the mouse will cause the screen display to pan across the sheet.
- **Using the Middle Scroll Button** : Scrolling the **MB** will zoom the display, either up or down.
- **Clicking the Right Hand Button** : If the **RHB** is clicked, the cursor will jump from its current position to the menu bar. The last used menu will be displayed. This option should be used, for example, if you want to change a Point's Name position. Move the cursor onto, or close to, the required Pint, click the RHB and then select the required command.



Example of a Least Squares Network plot showing the Error Ellipses

General Changes made to SURPAC Software

Creating Google Earth KML files : It is now possible to create **Google Earth KML** files, even if **SURPAC** is unable to locate the **Google Earth** installation. **SURPAC** will warn you that it cannot locate **Google Earth**, but that it will create the required **KML** file and then store this in the usual "**C:\Surpac_GE**" folder. This facility is mainly for Users running a 64 bit version of **Windows Vista** or **Windows 7**. **SURPAC** is a 32 bit application and, therefore, is not able to directly call a 64 bit application. (This is only applicable if the ellipsoid used for the current Co-ordinate file is **WGS84**.)

Importing DXF/DWG files : The importing of **DXF/DWG** files has been improved by the inclusion of **3DFACE**, **TRACE** and **SOLID** items. The **SOLID** items are imported as **Hatch** items, using the original **DXF/DWG** colour. The **SURPAC General CAD** programme now supports the full range of the **AutoCAD** Standard Colours.

The Diagram CAD Programme : Diagrams can now accommodate a larger number of **Servitude** and **Excluded Figure** points. The total number of points on a **Diagram** remains at 300.

Co-ordinate File Headings : Previously, the stored **File Heading** and **Mean Height above Sea Level** for a **Co-ordinate file** were not being recalled when the file was reloaded. This has now been corrected.

Sheet Panning – All CAD files : The Sheet Panning used previously shifted the Sheet in the opposite direction to the cursor movement. (*Panning is carried out by pressing and holding down the Mouse LHB and then moving the Mouse*).The thinking behind this Panning movement was that the cursor should be moved towards the are of the Sheet that needs to be viewed.

However, this type of Panning is in conflict with the Panning method used by applications such as **Google Earth** and **AutoCAD**. In these applications, the mouse "grabs" the current display and then moves it in sympathy with the moving cursor. As many Users often run **SURPAC** and **Google Earth** simultaneously (to view the current survey, for example) these conflicting Panning techniques do cause a problem for the User.

To overcome this, the **SURPAC** standard Panning technique has now be changed to match that used by **Google Earth**, i.e. when pressing and holding down the Mouse LHB, the screen view of the Sheet will be moved in sympathy with the moving cursor.

If you prefer to revert to **SURPAC**'s previous method of Panning, then do the following :-

1. Go to the **Co-ordinate File Editing** Programme
2. Click on the [**File Options**] button on the **Actions Bar Menu**.
3. in the bottom right panel shown on the displayed "File Options" form, de-select the option "**CAD Panning – Move the Sheet with the Mouse :** "

Lat, Long ASCII Output : When creating an **ASCII** file of [Lat, Long] values (from the Co-ordinate file), the programme was reporting an "error 730". This has now been corrected.

Two Sides and the Included Angle : When printing the result of this calculation, the co-ordinates of the second fixing Point were incorrectly displayed. This has now been corrected.

SURPAC Programmes Modifications for Version 5.35, Release 05

SURPAC Version 5.35, Release 05 - Programme Modifications

This upgrade for **SURPAC** consists mainly of minor corrections and "tweaks" to the software, covering various programmes. There have been quite a few of these since the last upgrade was issued in March 2010 and the list below covers a few of the more important modifications.

Horizontal Curve Alignment - This programme now allows for the input of the **Start** and **End** point co-ordinates of the defined Centre Line, by allowing the entry of Names of the points if they exist in the current **Co-ordinate File**. This programme has also been modified to accommodate Centre Lines that consist of one straight line between the defined **Start** and **End** points.

Plotting CAD Sheets to a Network Printer – Previously, **SURPAC** would not recognise a plotter/printer attached to a network computer, unless the "C:" drive of that computer had been "mapped" on the computer sending the CAD Sheet to be plotted. (Mapping of a computer hard drive is done via the "**Tools/Map Network Drive ..**" menu option of the **Windows Explorer** application.)

I have done various test using my own local network and this problem seems to have been resolved. However, if you still experience problems plotting to a network printer, please let me know. Please note that a temporary solution to the problem, if it persists, is to first output the CAD Sheet to a **PDF** file and then plot the **PDF** file via **Adobe Reader**.

Naming Points on General Plan and Working Plan Sheets - A Point **Name** may only be positioned on up to **4** different **General Plan** sheets and up to **3** different **Working Plan** sheets at any one time. Although this is normally sufficient,, this sometimes led to a Naming confusion which **Point Names** that had been previously set on a Sheet suddenly being removed. This typically occurred when a **Point** had been **Named** on one or more Sheets that were subsequently deleted.

SURPAC now includes a small routine for the **GP** and **WP** Sheets that, when **Naming** a **Point**, checks to make sure that if a **Point** has been previously **Named** on a Sheet (other than the current Sheet), that that Sheet still exists. If the **Point** in question had been previously **Named** on a Sheet that was subsequently deleted, then that **Name** reference is removed.

General Plan CAD – Previously, the [**Ctrl**]+[**Y**] Command was not working correctly. This has now been fixed.

Diagram CAD – The maximum number of **Line** and **Text** items has again been increased to help accommodate large and complex A0 and A1 size Diagrams.

Previously, when using the automatic **Area, Data & Consistency** generation (selected either from the "**Figure**" menu or by using the [**Ctrl**]+[**D**] Command), the routine failed if key words such as "Servitude", "Excluded" etc. where written in the top margin of the Diagram. This has now been corrected.

SURPAC Version 5.36, Release 01 - Programme Modifications

Modification to all DXF and DWG Import Routines

Before this Upgrade, **SURPAC** was only able to import **DXF** and/or **DWG** files up to the version **AutoCAD 2000**. This has now been changed and **SURPAC** is now able to import **Line**, **Arc**, **Text**, **Point** and **Hatch** information from all versions of **AutoCAD** compatible **DXF** and **DWG** files, up to and including, the current **AutoCAD** version (**2010/2011**).

Versions of **DXF** and **DWG** files currently supported by **SURPAC** for data importing :-

AC1004 Release 09
AC1006 Release 10
AC1009 Release 11 & 12
AC1012 Release 13
AC1014 Release 14
AC1015 AutoCAD 2000/2002
AC1018 AutoCAD 2004/2005/2006
AC1021 AutoCAD 2007/2008/2009
AC1024 AutoCAD 2010/2011

These **SURPAC** importing routines are compatible with **AutoCAD** generated **DXF** and **DWG** files. Note that **DXF** or **DWG** files generated by other, third party applications may not be compatible.

The changed **DXF** and **DWG** import routines apply to :-

the **General CAD** programme,
the **General Plan CAD** programme,
the **Sectional Title CAD** programme,
the **Working Plan CAD** programme,
the **Diagram CAD** programme and
the **Co-ordinate File Editing** programme (for **Point** import from **DXF**/**DWG** files)

General Programme Modifications

Observation File Security – Users can now apply a **Security lock** to all **Observation Files** accessible from a given computer. Once a **Password** has been allocated, all Users of that computer would be required to enter the **Password** in order to modify (**Edit**, **Insert** or **Delete**) any data lines on any **Observation File** accessed from that computer. This would, for example, allow a Chief Surveyor the ability to set a **Password** protection on all computers being used by staff members, but leaving his own computer free to modify any required **Observation Files**.

The **default Password** for **Observation File** security is **ABCD1234** and when this value is set, the programme presumes that no security protection is required. Leaving the **Password** as **ABCD1234** will leave the **Observation Files** unprotected. Hence, a new **Password** can be set to protect files for a specific reason or for a specific time. After this, the **Password** can be reset to the above default vale and the file protection will be removed.

Once a **Password** (other than the default value) has been set on a computer, any User of that computer will have to enter the set **Password** in order to modify a file's data line. When entering the **Password**, the User has the option of :-

1. unlocking the file for modification for either one action (the current action), or
2. unlocking the file for modification for the entire current **SURPAC** session.

New option for "Reset Text Attributes" Command (all CAD programmes) – This new option allows all **Text** items satisfying the User set criteria, to be changed to be either all **Upper Case** or all **Lower Case** characters.

Contour CAD – Erasing Surface Edge Triangles – When creating **Contours** from **Surface Triangulation**, **Edge Triangles** are those triangles, constructed through the auto-triangulation process, that lie outside the area required by the User for the contour display. **Edge Triangles** cannot be modified (normally by using the [**F11**] Command), as they only have one of their sides common with any other triangle.

When giving the [**F11**] Command on one of these **Edge Triangles**, a message is displayed prompting "*Do you want to Delete this edge Triangle?*". Previously, this message would be displayed every time an **Edge Triangle** was selected, which required a [**Yes**] or [**No**] response and which was a bit time consuming.

To make the deletion of multiple **Edge Triangles** go a lot faster, you can now select the [**Cancel**] option the first time the message is displayed and this will **Delete** any **edge Triangle** selected, without displaying the message, for the remainder of the current session.

Standard Helmert Transformation – Previously, if a manual transformation was carried out, using manually entered transformation parameters, the programme was not allowing for the option to Store the transformed Points into the current Co-ordinate file. This has now been rectified.

Sending Point Information to Google Earth – Previously, if a Point sent to **Google Earth** from **SURPAC** had a null, or blank Point Description, the resultant **KML** file would display an error when loading into **Google Earth**. This has now been fixed.

GoldFields to WGS 84 Conversions – This routine was showing an error when converting data on any of the **GoldFields** systems to any of the **WGS 84** Systems (for South Africa only). This problem has now been resolved.

Diagram CAD – There was a printing problem, whereby a blank sheet was being ejected by the printer before the actual Diagram was printed. This has now been fixed.

Working Plan CAD – There was a problem when attempting to **Erase Inset Points** from a **Working Plan** sheet. This has now been rectified.

General Plan CAD – **Circles** within a **Data Block** that had been added to the **General Plan** (by using the "**Import form a GP Data Sheet**" menu option, or by using the **Frame Copy** Command) were not being stored and hence were not shown on a printout of the **General Plan**. This problem has now been resolved.

Creating PDF files for CAD Sheet Outputs – Finally, Users are once again warned against using **PDF** Writing applications that offer no support or upgrade features. These are usually applications that are downloadable, free of charge, from the Internet.

In the last couple of months I have had 3 instances where Users have had erroneous **PDF** documents generated by such applications. These normally involves missing graphics (such as signatures), or text items written in mirror image and/or printing in the opposite direction. Remember "Goedkoop is duurkoop", so rather pay a few Rand and obtain a reliable application with a good reputation and with good back up.

SURPAC Version 5.36, Release 02 - Programme Modifications

General Programme Modifications

Long Section Creation – When creating a new **Long Section**, by reading or interpolating points from a Tacheometric file, the programme was not starting the section from Chainage 0.000, even when this was specified as the starting chainage. This has now been fixed.

Importing the Nearest Trig. Beacons and/or TSMs – This option will now compare and display the [Y, X, Z] values of any imported **Trig**. or **TSM** point with the values of an existing point that has the same name. The User will then be able to select either of the two sets of values, or select the means of the two sets.

Printing Calculation Pages to VPG text files – When printing calculation pages to a **VPG** file, the programmes was omitting the page headings. This has now been rectified.

Observation Files – After importing or downloading an **Observation File**, two blank lines were inserted at the end of the file. This has now been fixed up.

General CAD and General Plan CAD programmes – A new facility has been added which allows for the calculation of "**Points Off-Line**" between two defined terminals, or along a line of best fit. This programme has always been available under the **General** main menu heading, but now the calculation can be carried out whilst working in the either of these two **CAD** programmes. The required line terminals are defined graphically.

To call this function, click on the **Point** menu heading and then select the menu item **Point off-Line Calculations**. Move the cursor onto the first required line terminal and click the mouse LHB. Then move the cursor onto the second required line terminal and again click the mouse LHB. The **Off-Line** form will then be displayed and will show the two terminals selected. Proceed by selecting the required tolerances etc. and then click the [**Locate Line Points**] button. Finally, either of the two options may be selected to move the located points on-line, or to calculate new on-line points.

General CAD, General Plan, Working Plan and Sectional Title CAD programmes – These programmes have all had a new function added, which allows for the quick and simple visual resetting of the **Sheet Centre** position.

Before calling this command, first set the screen display of the Sheet so that the entire Sheet is visible, then click either the **Edit** or the **General** menu headings and then select the menu item called **Select a new Sheet Centre**. Move the cursor to the required new Sheet Centre position and then click the mouse LHB. You can use the mouse MB to quickly repeat this command in order to adjust the selected Centre position, if required.

General Plan CAD programme – A new option has been added which allows the drawing of a circle at a defined line bend point. This command is used to indicate the position of a line bend when there is no point calculated at that position.

To call this command, move the mouse close to the bend point and then click the mouse RHB. Then click on the **Point** menu heading and then select the menu item **Draw a Circle (Line Bend Position)**.

Mining Peg calculation programmes – These programmes (Double Set Up, Double Button and Double Back Fix) have been modified to work correctly when the current Co-ordinate File System is defined as a **UTM** system.

SURPAC Training Facility

I am pleased to announce that there are now fully fledged training courses available for all **SURPAC** Software Modules, including :-

General Surveying,
Topographical Surveying,
Engineering Surveying,
Surface and Underground Mine Surveying,
Cadastral Surveying (for South Africa, Namibia, Swaziland, Lesotho, Botswana, Zimbabwe, Zambia and Malawi)

These courses are given by :-

Kingray Gowera | Spatial-iQ
Tel: +27112588746 | Mobile: +27768656038 | Skype ID: kgowera

Spatial-IQ is situated at Sandton, Gauteng. However, they are able to provide 2, 3 or 4 day training courses at any location where there is sufficient demand.

To view feedback and fuller training information, please visit **www.surpac.co.za** and click on the [**SURPAC Training Courses and Information**] button.

SURPAC Version 5.36, Release 03 - Programme Modifications

General Programme Modifications

Running SURPAC under Microsoft Windows 7 – If you intend replacing your old PC and/or Laptop running ***Microsoft* XP** (or even **98**), and you intend replacing this with a new computer running **Windows 7**, do not install **SURPAC** using an installation CD that does not specifically state that the installation is for **Windows XP/Vista/7**. Doing this may cause installation problems and **SURPAC** may not run correctly.

If you have a current and active Software Maintenance Contract for **SURPAC**, rather go to our web site **www.surpac.co.za** and click on :-

[Download and Install SURPAC Software]

Follow the on-screen instructions for downloading and installing **SURPAC**, after which send me an e-mail (keith@surpac.co.za) identifying who you are and at which company, or Mine, you are employed. I will then e-mail new security files to you to re-activate your License.

Google Earth changes – Modifications have been made to **SURPAC** to accommodate changes made to **Google Earth** in Version 6.0.3. The changes made in **Google Earth** impacted on the functions in **SURPAC** that import **Paths** (or **Lines**), **Polygons** and **Place Marks** from **Google Earth**. If you are still using **Google Earth** Version 5.* or earlier, these modified functions will still work, but nevertheless, Users are advised to upgrade to the latest version (6.0.3).

General Plan, Sectional Title & Working Plan programmes – When calculating parallel lines (**Line Shift** command) when the sheet was swung from True North, the distance used to calculate the positions of the parallel lines was incorrect. This has now been fixed.

Addition of the Kolida KTS 400 Series Total Station – The option to import data from an **ASCII** file, generated by a **Kolida KTS 400 Series Total Station** has been added to **SURPAC**.

Least Squares Adjustment of Trig. Heights – When the **Date** and **Time** were included in the **Observation** file used for calculating the adjustment, they caused problems in identifying the correct set up stations. This has now been rectified.

Co-ordinate File Selection form – The form used by **SURPAC** to allow the selection of a **Co-ordinate** file has been improved. The listing of the files in a selected folder has been extended to allow easier viewing.

General CAD programme – This programmes was causing the sheet information to appear "smeared" on the screen when the bottom left portion of an A0 sheet was being displayed at a large scale. This problem has now been rectified.

Longitudinal Sectioning programme – When reading centre line points from a **Tacheometric** file, the programme was causing a duplication of some points when the defined **Bend Points** produced a series of near parallel lines. This has now been fixed.

Locate and Mean Point Groups in a File – This programme was not **Saving** a Group Mean Point, if the Point's Name was manually entered. This has now been rectified.

SURPAC Training Facility

This is a reminder that detailed training courses are now available for all **SURPAC** Software Modules. The separate training courses cover the following topics :-

General Surveying,
Topographical Surveying,
Engineering Surveying,
Surface and Underground Mine Surveying,
Cadastral Surveying (for South Africa, Namibia, Swaziland, Lesotho, Botswana, Zimbabwe, Zambia and Malawi)

These courses are given by :-

Kingray Gowera | Spatial-iQ
Tel: +27112588746 | Mobile: +27768656038 | Skype ID: kgowera

Spatial-IQ is situated at Sandton, Gauteng. However, they are able to provide 2, 3 or 4 day training courses at any location where there is sufficient demand.

To view feedback and fuller training information, please visit **www.surpac.co.za** and click on the
[**SURPAC Training Courses and Information**] button.

SURPAC for Windows XP/Vista/7 Version 5.37, Release 01

New SURPAC Google Earth Elevation Functions

These new **SURPAC Google Earth** functions make use of the importation of elevation, or height data interpolated via the **Google Earth Elevation API**. This function allows for the interpolation of heights of locations anywhere on the **Google Earth DTM**.

Summary

Based on tests carried out on data samples in areas in South Africa, it would appear that the interpolated **Google Earth** heights are, in general, accurate to about 3 - 4 metres. However, this figure can be improved to below the 2m level by carrying out a comparison between surveyed ground heights and **Google Earth** interpolated heights for selected points in an area, and then adjusting the interpolated **Google Earth** heights for the mean area height difference. These results must be seen as estimates and might not be applicable in your area. This can best be tested by using ground control points for comparison. Nearby standard Trigonometrical Beacons can also be used for ground control *(bear in mind that the Beacon height is the top of the pillar, which is usually 1.4m above ground level)*.

Applications

Generating **Contour** and **DTM** files via downloaded **Google Earth** data provides rapid and useful data that have various small scale applications. When displayed in conjunction with an imported **Google Earth** image, these become even more useful. The generated **Contour** and **DTM** files can also be exported as **KML** files for client viewing directly on **Google Earth** itself. Examples of useful applications are for :-

- Township planning approval
- Sub-divisional planning approval
- Preliminary water/gas/fuel pipe alignment assessment over long distances
- Preliminary road/rail alignment assessment over long distances
- Cross section data for preliminary mass haul calculations
- Preliminary dam site investigations (water volume versus wall height etc.)

1. Co-ordinate File Editing Programme

1.1 Import Points from a KML file – This existing function has been extended so as to allow the import of multiple Points contained in a **KML** file, and not just a single Point as was the case previously.

1.2 Importing interpolated Google Earth DTM Heights – This function allows you to import interpolated heights from **Google Earth** for any, or all Points existing in the current **Co-ordinate** file. You may define the entire file, or mark (highlight) selected points in the file. Heights will only be imported for points whose current heights do not exist. Existing heights will not be overwritten.

Using this Option :

If you want to restrict the import of heights to selected Points, then first highlight these Points in the Co-ordinate file listing. You can highlight Points by :-

I. **Highlight a block of Points** by clicking on the first Point and then dragging the mouse cursor to the last required Point, or
II. **Highlight a block of Points** by clicking on the first Point and then, holding down the [**Shift**] keyboard key, click on last required Point.
III. **Highlight selected Points** by clicking on the first Point then, holding down the keyboard [**Ctrl**] key, click on any other Points required.

Then, in the **Actions** Menu, click on the **[File Options]** menu item to display the **File Options** form. The **Google Earth** options are at the bottom of this list of options. Click on **Import interpolated Google Earth Heights** and then click on the [**OK**] button. If you

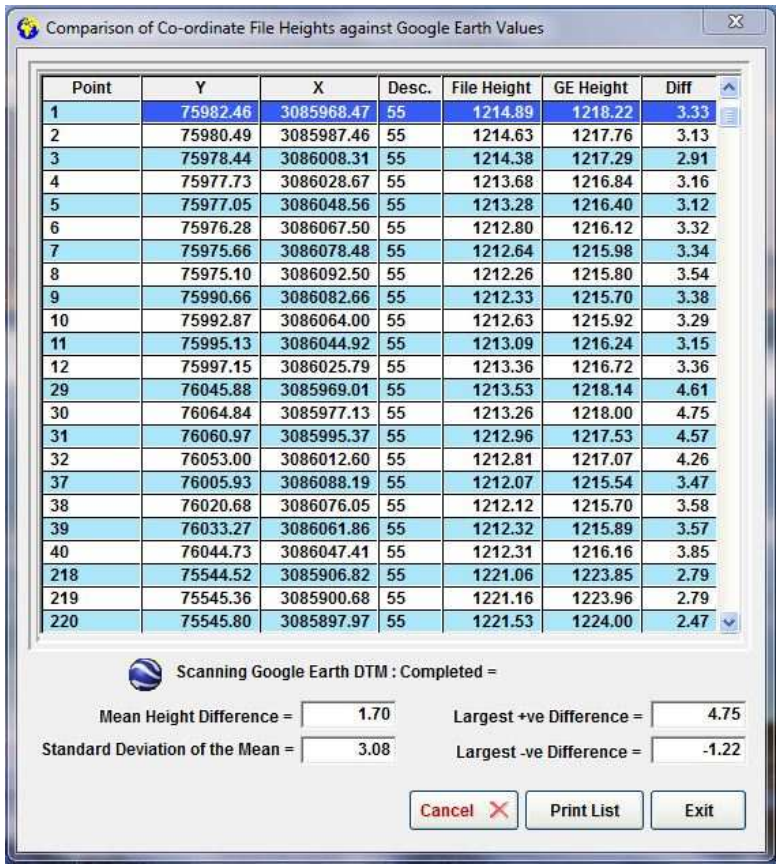
have highlighted a set of Points, you will be prompted if you want to restrict the height importation to these Points. Reply as appropriate.

Heights for the selected Points, or for the entire file will now be imported via interpolation from the **Google Earth DTM** and displayed on the Co-ordinate file listing. These height importations are relatively slow and are imported at a rate of approximately 50-80 Point heights per minute, depending on your internet connection. speed. The maximum Point heights that may be imported are restricted by **Google Earth** to 2,500 per day.

1.3 Compare Existing heights with interpolated Google Earth Heights – This function allows you to compare existing Co-ordinate file heights with interpolated heights from the **Google Earth DTM**. You can define the entire file, or mark selected points in the file. This function is useful when needing to evaluate the accuracy of imported **Google Earth** Heights against surveyed values.

Using this Option :

If you want to restrict the comparison of **Google Earth** heights to selected Points, then first highlight these Points in the Co-ordinate file listing as explained above. Then, in the **Actions** Menu, click on the **[File Options]** menu item to display the **File Options** form. Click on **Compare File and Google Earth Heights** and then click on the [**OK**] button. If you have highlighted a set of Points, you will be prompted if you want to restrict the height importation to these Points. Reply as appropriate.


Comparison of Co-ordinate File Heights against Google Earth Values
Scanning Google Earth DTM : Completed =
Mean Height Difference = 1.70
Standard Deviation of the Mean = 3.08
Largest +ve Difference = 4.75
Largest -ve Difference = -1.22
Cancel
Print List
Exit

Point	Y	X	Desc.	File Height	GE Height	Diff
1	75982.46	3085968.47	55	1214.89	1218.22	3.33
2	75980.49	3085987.46	55	1214.63	1217.76	3.13
3	75978.44	3086008.31	55	1214.38	1217.29	2.91
4	75977.73	3086028.67	55	1213.68	1216.84	3.16
5	75977.05	3086048.56	55	1213.28	1216.40	3.12
6	75976.28	3086067.50	55	1212.80	1216.12	3.32
7	75975.66	3086078.48	55	1212.64	1215.98	3.34
8	75975.10	3086092.50	55	1212.26	1215.80	3.54
9	75990.66	3086082.66	55	1212.33	1215.70	3.38
10	75992.87	3086064.00	55	1212.63	1215.92	3.29
11	75995.13	3086044.92	55	1213.09	1216.24	3.15
12	75997.15	3086025.79	55	1213.36	1216.72	3.36
29	76045.88	3085969.01	55	1213.53	1218.14	4.61
30	76064.84	3085977.13	55	1213.26	1218.00	4.75
31	76060.97	3085995.37	55	1212.96	1217.53	4.57
32	76053.00	3086012.60	55	1212.81	1217.07	4.26
37	76005.93	3086088.19	55	1212.07	1215.54	3.47
38	76020.68	3086076.05	55	1212.12	1215.70	3.58
39	76033.27	3086061.86	55	1212.32	1215.89	3.57
40	76044.73	3086047.41	55	1212.31	1216.16	3.85
218	75544.52	3085906.82	55	1221.06	1223.85	2.79
219	75545.36	3085900.68	55	1221.16	1223.96	2.79
220	75545.80	3085897.97	55	1221.53	1224.00	2.47

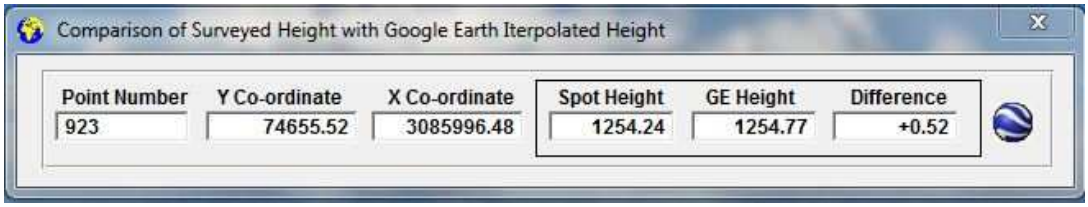
A form will be displayed in which the selected Points, their co-ordinates, description, surveyed heights and interpolated **Google Earth** heights will be shown. These height comparisons are imported at a rate of approximately 350-500 Point heights per minute, depending on your internet connection. Statistical data relating to the comparison of heights are shown at the bottom of the form.

There is also an option whereby you can compare **Google Earth** heights for a single, User selected Point.

Using this Option :

In the Co-ordinate file display, right click on the Point whose height you want to compare. On the “pop up” menu that will now be displayed, select the menu item **Compare Height with Google Earth**. A form will then be displayed showing the Point selected, its co-

ordinates and height, the **Google Earth** height and the difference. Moving the cursor away from this form will cause it to be removed.



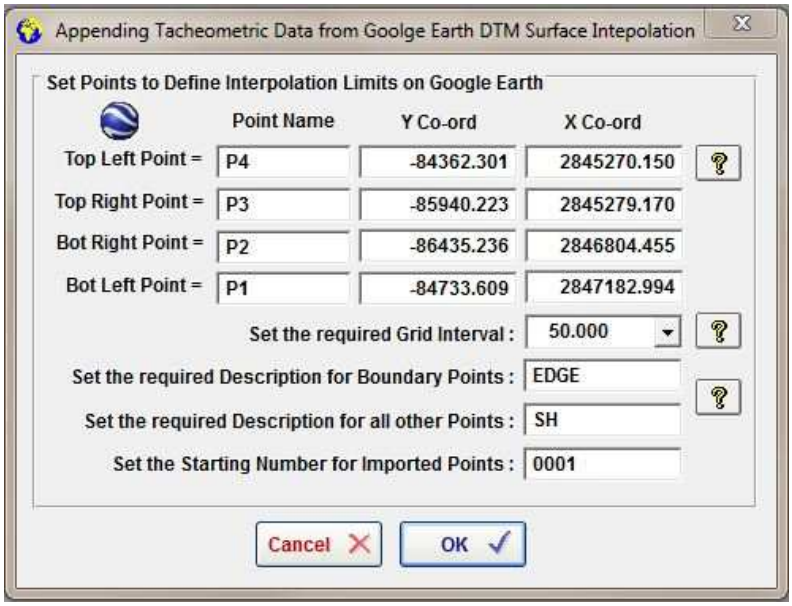
2. Tacheometric File Editing Programme

The main and most important function regarding the importation of **Google Earth** 3D data is the generation of **Tacheometric** files, using data solely imported via **Google Earth** interpolation, as explained below.

2.1 Import Points with interpolated Google Earth Heights – This routine allows you to import Point co-ordinates, along with their interpolated heights, from the **Google Earth DTM**. Points are imported over a User defined quadrilateral figure covering the required area, plus a User defined Grid interval.

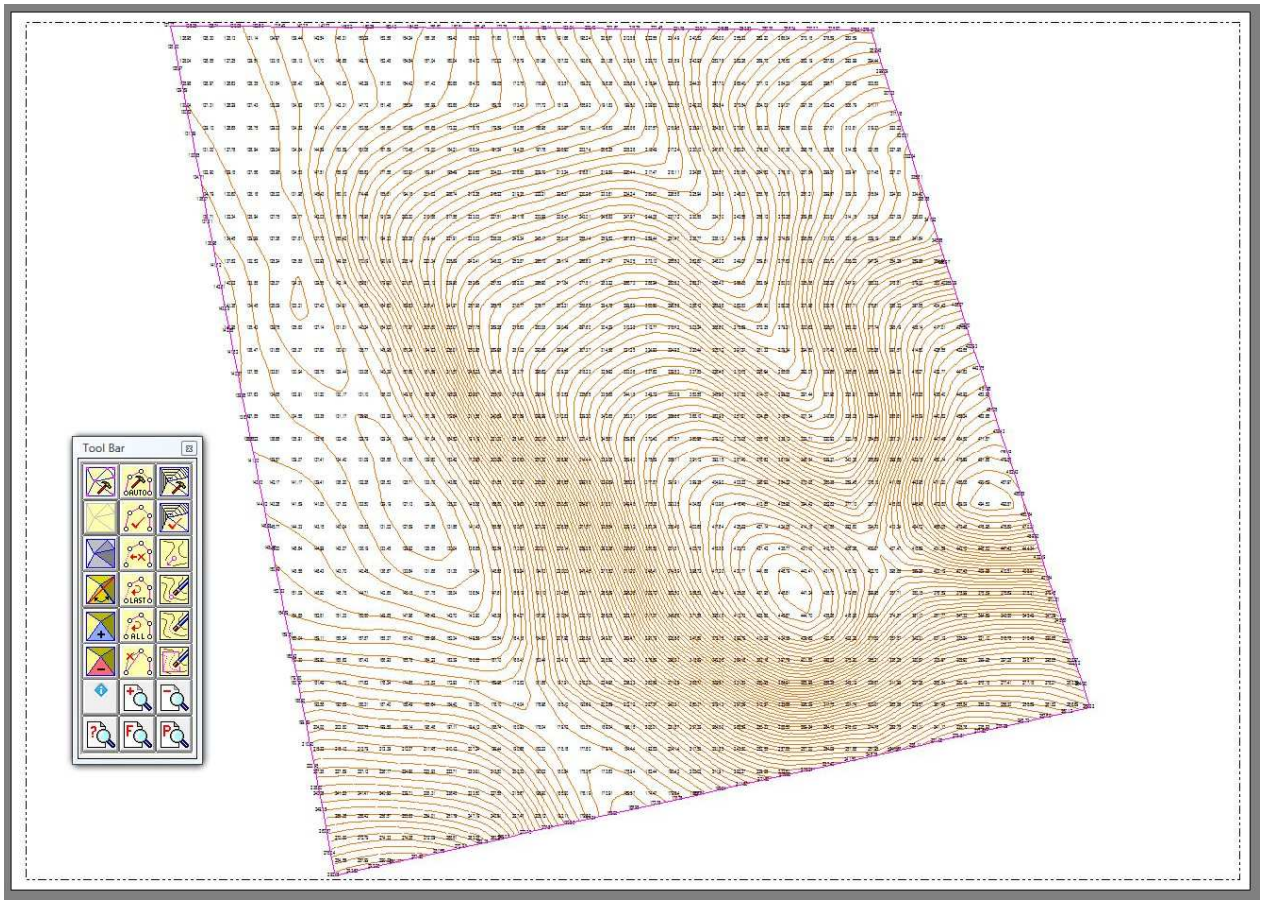
Using this Option :

In the **Actions** Menu, click on the **[Import GE Data]** menu item. The form below will be displayed, allowing you to enter the four points used to define the required quadrilateral. The named Points should exist in the current Coordinate file, otherwise their co-ordinates must be entered manually.



To ensure that the quadrilateral covers the correct area, these 4 Points are best determined by using **Google Earth** to create **Placemarks** at the appropriate positions. The quadrilateral does not have to be square, nor does it need to be oriented NS or EW. Any four Points that enclose the required area are sufficient. *One restriction is that, when entering the 4 Points into the above form, they must be entered in a clockwise sequence, normally starting at the Point that is approximately the NW corner.*

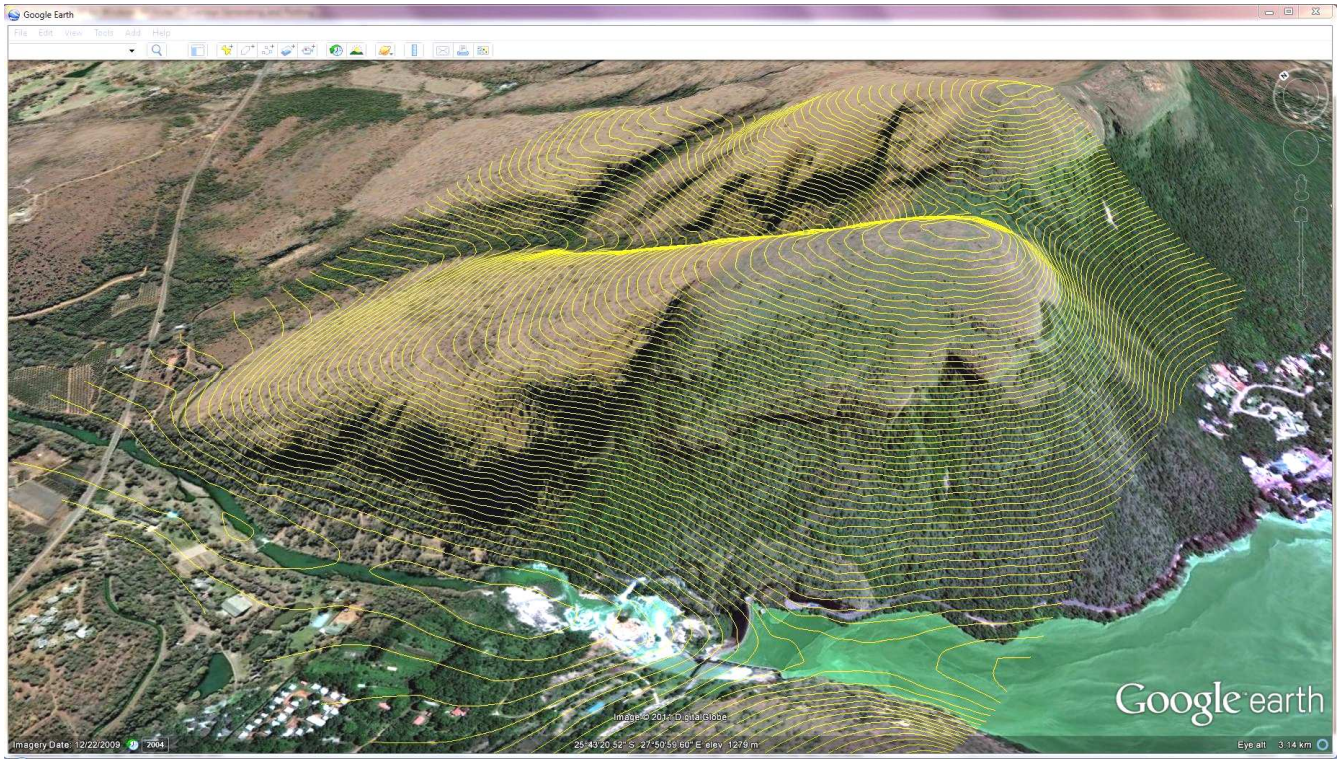
SURPAC will then proceed to calculate Tacheometric file points along the perimeter lines of the quadrilateral, as well as on all Grid intersections lying within the quadrilateral, using the defined Grid interval. Once all points are calculated, their heights are interpolated from **Google Earth** and all point data are added to the file. These Tacheometric points are imported at a rate of approximately 350-500 Points per minute, depending on your internet connection.



SURPAC Contour CAD, showing imported Google Earth Points on a 50m Grid

This generated **Tacheometric** file can then be used in the **SURPAC Contouring CAD** programme to construct and edit contour lines (using the Triangulation method) over the quadrilateral area, in the usual way.

The two preceding images and the one on the next page show the stages of generating a contour display from imported **Google Earth** points, i.e. defining an area, importing the data, creating the Contours and then displaying these contours on Google Earth via a **KML** file.



SURPAC 5m Contours of Hartebeespoort dam wall area using Google Earth Data

2.2 Compare Existing heights with interpolated Google Earth Heights – This function allows you to compare existing Tacheometric file heights with interpolated heights from the **Google Earth DTM**. .

This function is useful when needing to evaluate the accuracy of imported **Google Earth** Heights against surveyed values.

Using this Option :

In the **Actions** Menu, click on the **[Compare GE Hts]**. A form will be displayed in which the file Points, their co-ordinates, description surveyed heights and interpolated **Google Earth** heights will be shown. These height importations are imported at a rate of approximately 350-500 Point heights per minute, depending on your internet connection. Statistical data relating to the comparison of heights are shown at the bottom of the form.

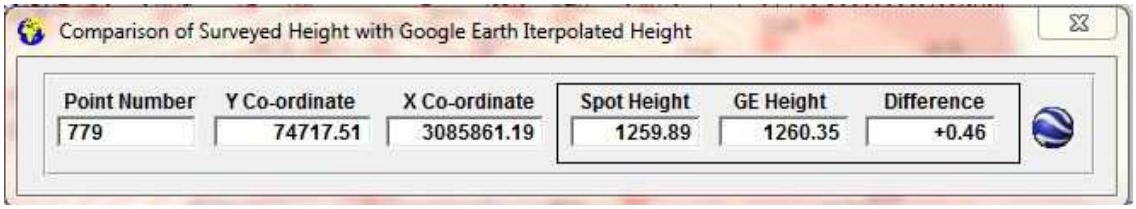
3. Contour Generating CAD Programme

3.1 Compare existing heights with interpolated Google Earth Heights – This function is the same as that described **Tacheometric File Editing** Programme, above.

Using this Option :

3.1.1 Comparing a Single Point

Right click on the Spot Height that is to be compared and then, from the **Spot Heights** menu heading, select **Compare Spot Height with Google Earth Height** (for a single Point). A form will then be displayed showing the Point selected, its co-ordinates and height, the **Google Earth** height and the difference. Moving the cursor away from this form will cause it to be removed.



3.1.2 Comparing the entire file

Click on the **Spot Heights** menu heading and select **Compare Entire File with Google Earth** Heights. A form will be displayed in which the Tacheometric file Points, their co-ordinates, description, surveyed heights and interpolated **Google Earth** heights will be shown. These height comparisons are imported at a rate of approximately 350-500 Point heights per minute, depending on your internet connection. Statistical data relating to the comparison of heights are shown at the bottom of the form.

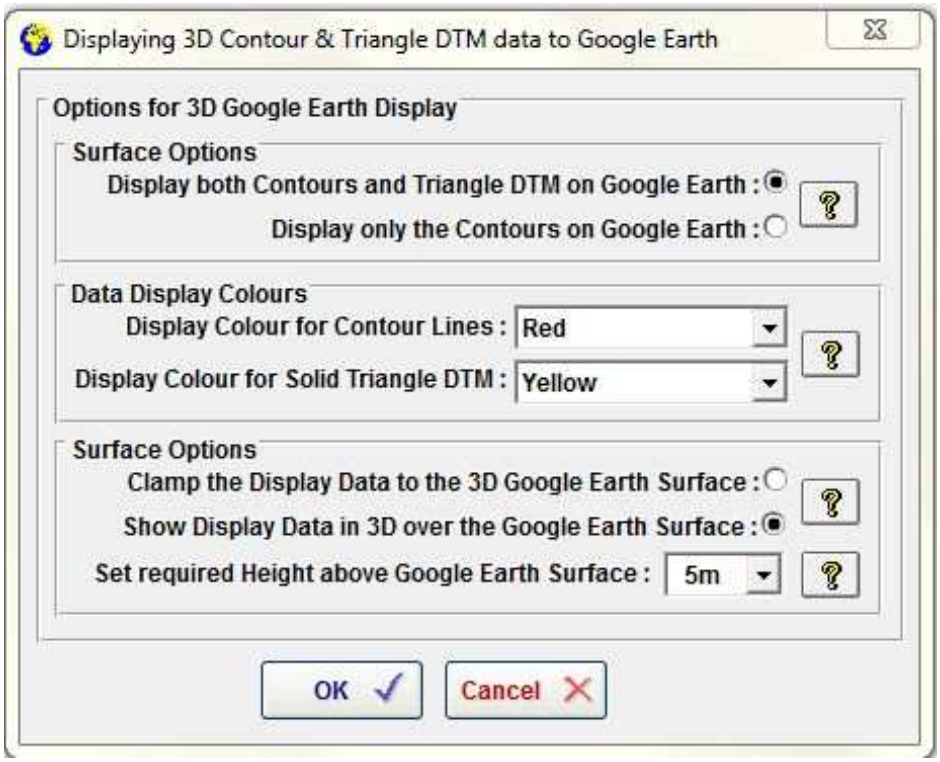
3.2 View 3D Contours & DTM on Google Earth – Once all the contours have been generated and edited, using the ***Surface Triangulation*** method, you can view the contours alone, or the contours and the solid 3D model created from the surface triangulation in situ on the **Google Earth** surface.

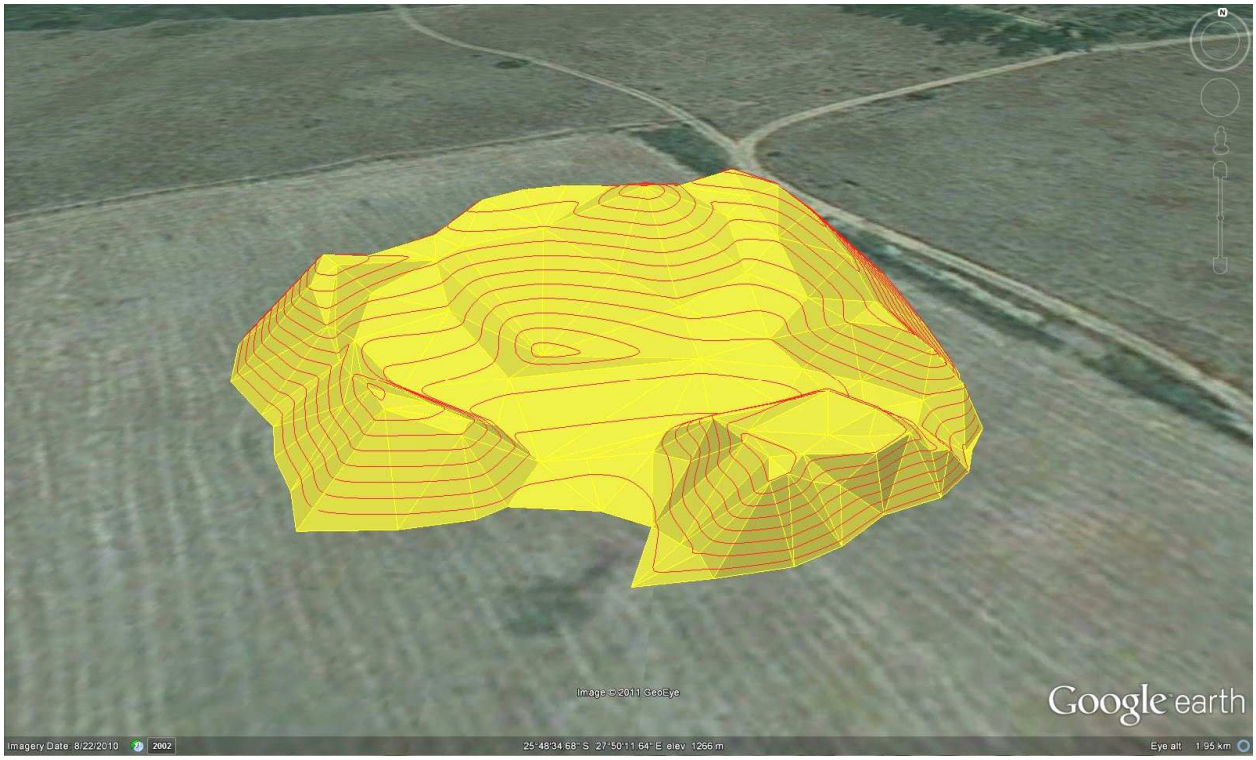
Using this Option :

Click on the **File** main menu heading and then select **View Contours & DTM on Google Earth** menu option.

On the displayed form, first read the help information by clicking on the **[?]** icons, to see the implications and use of the available options, especially with regard to the two **Surface Options**. These options allow for the display to be "clamped to the **Google Earth** " surface, or to have it shown as a free standing 3D model. The former method would be used for Contours that represent the natural earth surface and the latter for both Contours and DTMs of manmade features such as stockpiles, dumps and earthworks.

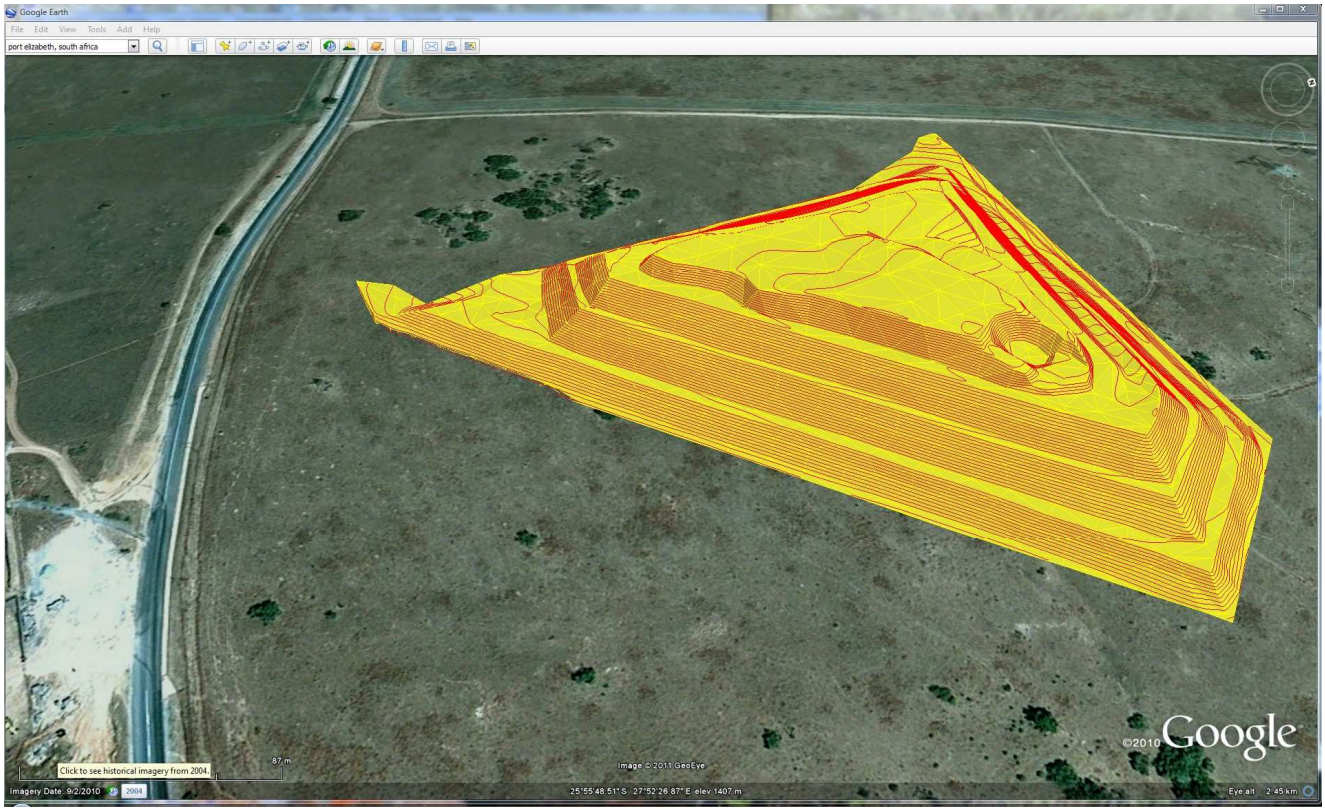
NB : ***Google Earth*** *will not display any imported* ***KML*** *data that lie below its own surface. Trying to display an excavation, for example, is not possible if the excavation Contours and DTM lie below the natural surface*.


Displaying 3D Contour & Triangle DTM data to Google Earth
Options for 3D Google Earth Display
Surface Options
Display both Contours and Triangle DTM on Google Earth :
Display only the Contours on Google Earth :
Data Display Colours
Display Colour for Contour Lines : Red
Display Colour for Solid Triangle DTM : Yellow
Surface Options
Clamp the Display Data to the 3D Google Earth Surface :
Show Display Data in 3D over the Google Earth Surface :
Set required Height above Google Earth Surface : 5m
OK
Cancel



SURPAC 3D Triangulation Model and Contours displayed in situ on Google Earth

In the above example, the “Show Display in 3D over the Google Earth Surface” was used. This mode is necessary for physical manmade features, such as dumps or stockpiles, that overlay the pre-existing natural surface.



SURPAC 3DTriangulation Model and Contours of a slimes dam survey, viewed in situ on Google Earth

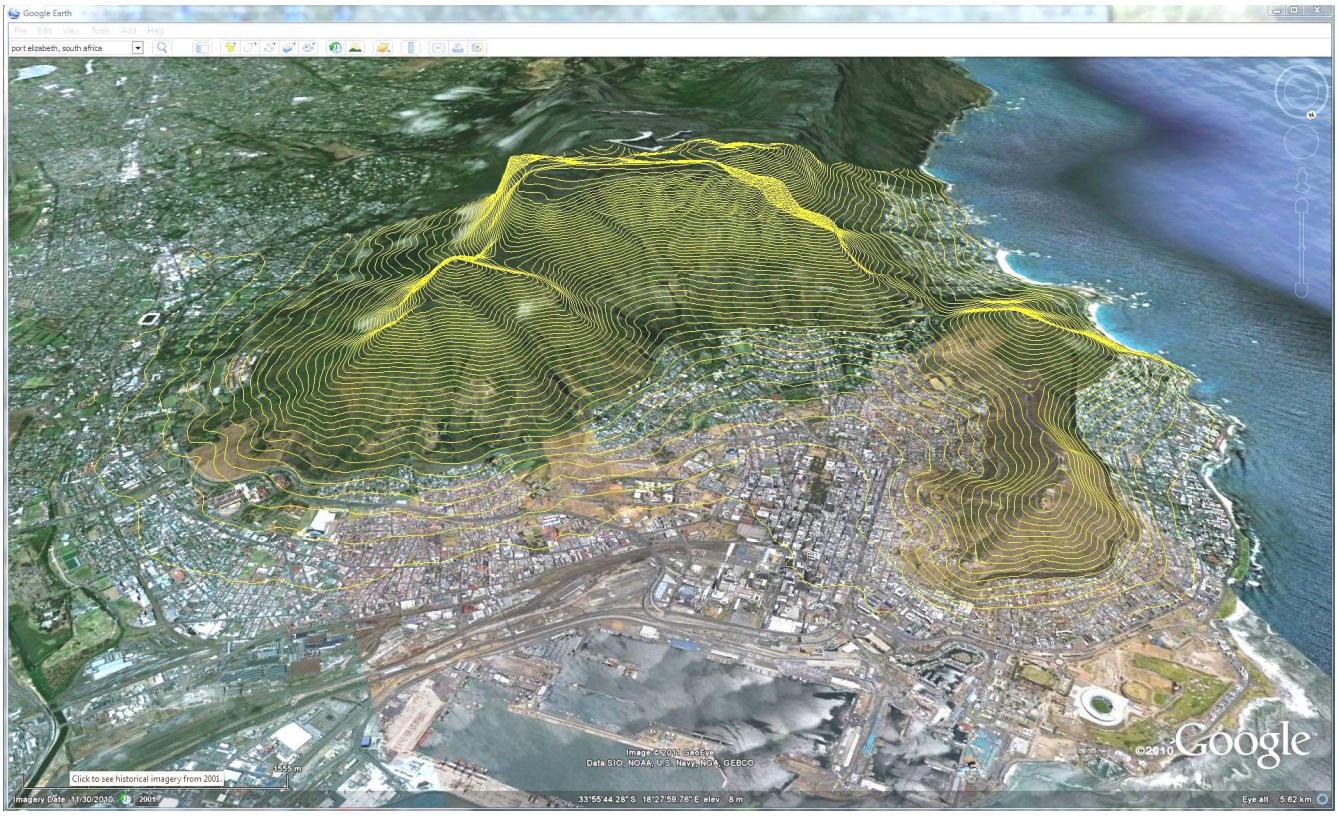
Summary on displaying 3D Models in Google Earth

*In **Google Earth** it is possible to view imported and superimposed **KML** data from various view ports. This can be done dynamically using the Mouse, as follows :-*

- ***Panning** – Hold down the Mouse Left Hand button and move the cursor in the desired direction.*
- ***Scaling** – Scroll the mouse scroll wheel forwards or backwards.*
- ***3D Object Viewing** – Move the cursor to the centre of the object, then hold down the Mouse Middle button. Moving the cursor forwards or backwards will change the Tilt (vertical) view point. Moving the cursor left or right will change the Orientation (horizontal) view point. The amount of vertical height exaggeration can be set in **Google Earth** by clicking on the **Tools** menu and selecting the **Options…** menu item.*

The following image of Table Mountain shows superimposed 20m contours, generated in **SURPAC** from **data** imported from **Google Earth**. The **KML** display uses the "Clamp to **Google** Earth Surface" option. As this covers a large area and a large number of points (a 50m grid was used), the data had to be imported in two sessions.

Google Earth will only allow the downloading of 2,500 "locations" per user per day. As **SURPAC** collects data at a rate of 4 points per location, this maximum daily limit is increased to 10,000 points. For areas that require more than this limit, separate the area into two or more sections and download the data on consecutive days (or just use a different e-mail addresses if you have them!)


Google Earth
port elizabeth, south africa
Image © 2011 GeoEye
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
©2010 Google
Click to see historical imagery from 2001
Imagery Date: 11/30/2010
33°55'44.28" S 18°27'59.76" E elev 8 m
Eye alt 5.62 km

SURPAC 20m Contours of Table Mountain using Google Earth interpolated Data

4. Longitudinal Sectioning Programme

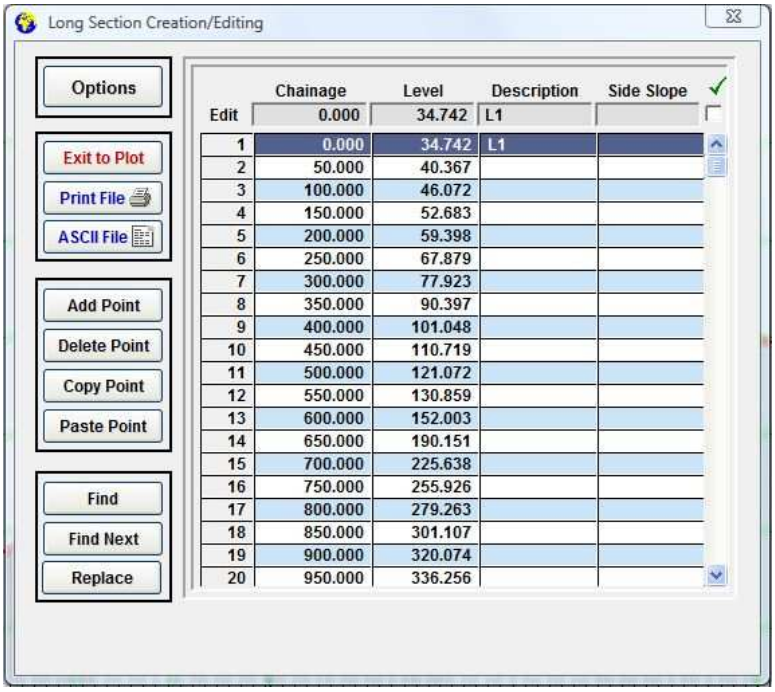
A new function has been added that allows for the generation of Longitudinal Sections by the direct importation of interpolated **Google Earth** Heights.

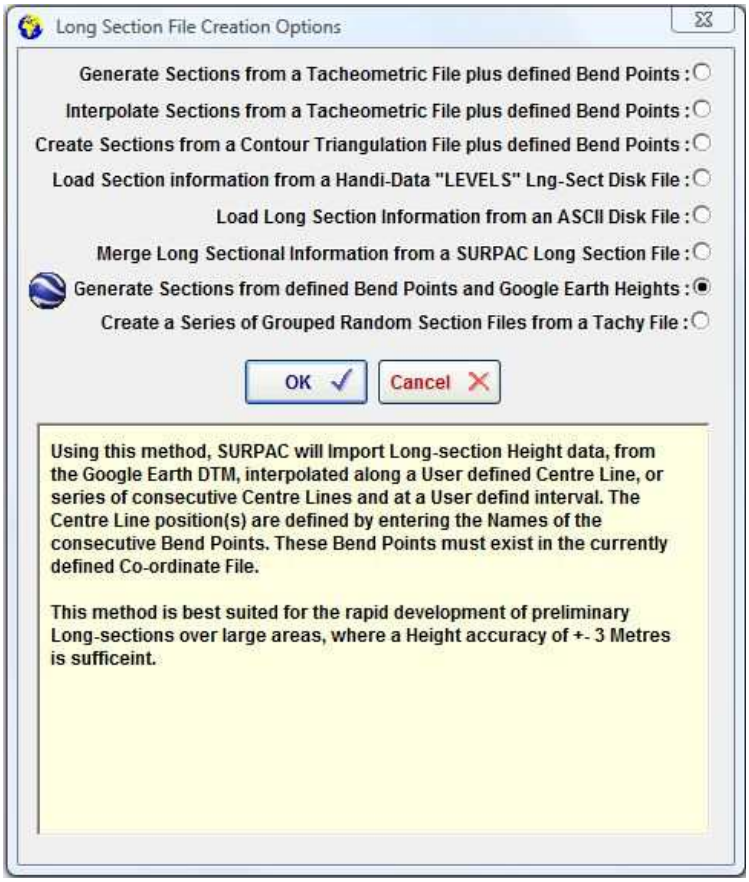
Using this Option :

Click on the [**Set File Type**] menu item in the **Actions** Bar menu. On the displayed form, select the "**Section Plotting Using a LONG-SECTION File only**" option and Click the [**OK**] button.

Click on the [**Select a File**] menu item in the **Actions** Bar menu. From the displayed form, enter the new **File Name** and Click on the [**Open**] button.

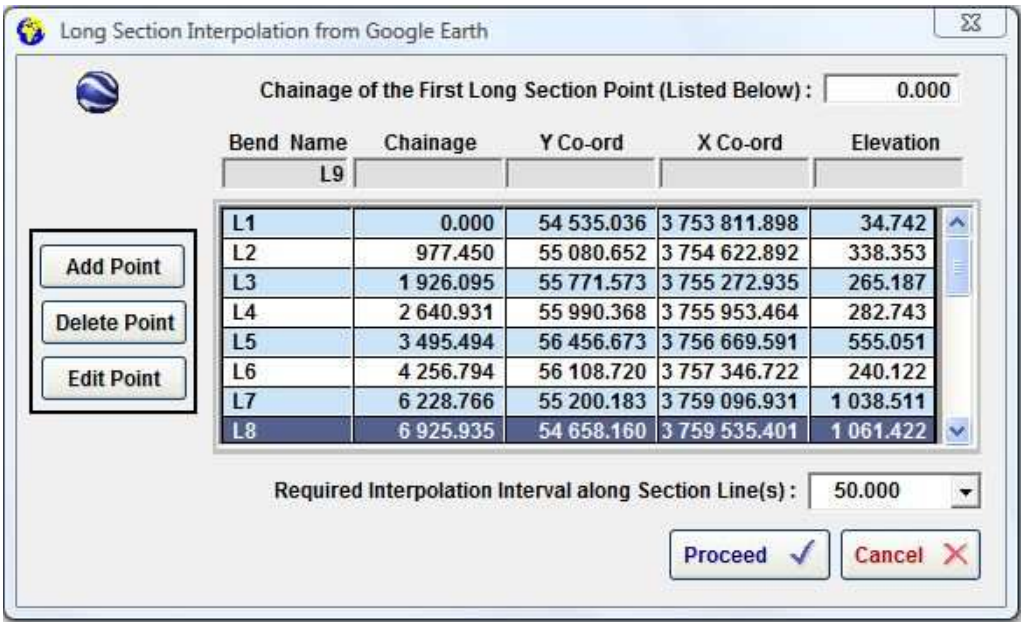
Once the "**Long Section Creation/Editing**" form is displayed, Click on the [**Options**] button. From the displayed list, select the "**Generate Sections from defined Bend Points and Google Earth Heights**" option and then Click the [**OK**] button.



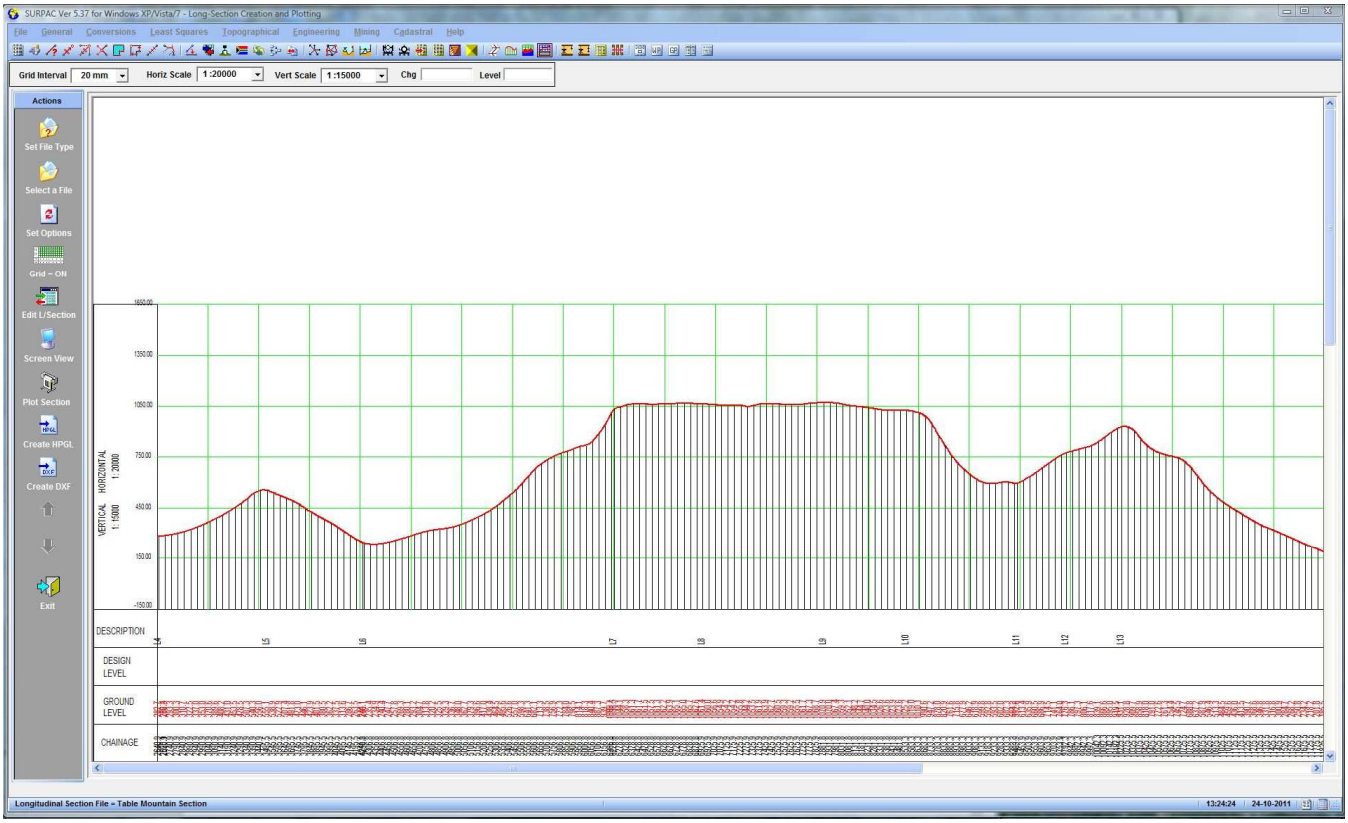

Long Section File Creation Options
Generate Sections from a Tacheometric File plus defined Bend Points :
Interpolate Sections from a Tacheometric File plus defined Bend Points :
Create Sections from a Contour Triangulation File plus defined Bend Points :
Load Section information from a Handi-Data "LEVELS" Lng-Sect Disk File :
Load Long Section Information from an ASCII Disk File :
Merge Long Sectional Information from a SURPAC Long Section File :
Generate Sections from defined Bend Points and Google Earth Heights :
Create a Series of Grouped Random Section Files from a Tachy File :
OK
Cancel
Using this method, SURPAC will Import Long-section Height data, from the Google Earth DTM, interpolated along a User defined Centre Line, or series of consecutive Centre Lines and at a User defind interval. The Centre Line position(s) are defined by entering the Names of the consecutive Bend Points. These Bend Points must exist in the currently defined Co-ordinate File.
This method is best suited for the rapid development of preliminary Long-sections over large areas, where a Height accuracy of +- 3 Metres is sufficeint.

A form will then be displayed that allows you to enter the **Bend Points** that define the Required **Long. Section**. These Points must exist in the current Co-ordinate File.

NB : *An easy way to import a series of **Bend Points** is to define a **Path** in **Google Earth** that follows the required route. This **Path** can then be imported into the **SURPAC General CAD** programme. After this, use the option that **Converts Line terminals into Points**. The [Y, X] values of these Points will then be stored in the Co-ordinate File. Finally, use the Co-ordinate File's "**Import interpolated Google Earth Heights**" option to height these **Bend Points**.*



Once all **Bend Points** have been entered, select the required **Interpolation Interval** for the section and then Click the [**Proceed**] button.



A SURPAC Long Section through Lion's Head, Table Mountain and Devil's Peak, using a Path and Heights imported from Google Earth

General Programme Modifications

Transforming "Lo" Cape Datum ←→ "WG" WGS 84

1. The search for the nearest common Trig. Beacons has been improved. The programme will now select common control points using a combination of the nearest Control points plus a spread of Control points in each of the four principle quadrants. If you use the standard "Nearest 5" Control points when transforming, then the programme will automatically select the nearest Control point in each quadrant, plus the next nearest point regardless of quadrant.
2. The minimum number of Control points that may be selected is now set to 4.
3. A new option has been added. This allows the you to select either "**Determine and Apply Individual Transformation Factors for each Point in the file**", or "**Determine and Apply a single Set of Transformation Factors from the file Centre value**". The latter option is best applied when the relative positions of the file points need to be retained. The first option is best applied when the file points are far apart, such as on large farm sub-divisions for example.
4. On the print out of the transformation, the most used common Control points are shown, as before, but with the addition of the number of times each Control point was used.

Exporting GPX files for GPS systems

This new feature can be found by clicking on the [**File Options**] menu item in the **Actions** menu of the Co**-ordinate File Editing** programme.

If you want to restrict the **GPX** file creation to select Points in the Co-ordinate file, then first highlight the required Points, as described on Page 2 of this document.

On the displayed form, select the option "**Export Data to a GPX File (for GPS systems)**". Reply as appropriate to the prompt "**Do you want to restrict the Transferring of Point Data to Selected (Highlighted) Points?**", if you have highlighted a set of Points. Then define a **Path** and **Name** for the **GPX** file to be created using the displayed form. The **GPX** file will then be created. Points will be stored in the **GPX** file as "**Way Points**".

***Useful Tip** : If you have **Google Earth** running, you can "drag and drop" the **GPF** file on to **Google Earth** and view the **GPF** file points.*

Section title Sheet Creation/Edit CAD

This programme has been extended so as to accommodate up to 485 Section Title areas in the **Participation Quota** Sheets.

SURPAC General CAD Programme

Importing ESRI Shapefiles (*.shp) into SURPAC via DXF

Although **ESRI Shapefiles** (***.shp**) cannot be imported directly into **SURPAC**, there is an application available that will convert **Shapefiles** into the **AutoCAD DXF** format.

This function was initially covered in **SURPAC** Version 5.31 in 2007 but, following recent queries, it appears that not many Users are aware of this function. Importing Shapefiles into **SURPAC** does required the use of an external application called "**dxfAuthor.exe**". This application was written by **ESRI** in Massachusetts, USA. It is a free application that could be downloaded, but the web site has recently been closed down and the application can no longer be downloaded as was initially reported in Version 5.31.

Included in this Upgrade of **SURPAC** is the self-extracting zipped file called "**dxfauth.zip**", that will have been saved in the same folder in which the **SURPAC** Software is installed.

- Locate the file using the ***Windows Explorer*** and double click on the file icon.
- When prompted, select a suitable folder and then press the [**Unzip**] button. After extraction, close down the Zip application.
- Go to the folder where the unzipped files are saved and then double click on the "**SETUP.exe**" application.
- Select an appropriate folder for installing the "**dxfauthor.exe**" files and then install.

NB : *Included in this Upgrade of **SURPAC** is the Word document "**dxfAuth – Help Pages.doc**", that provides a worked example on creating a **DXF** file from **Shapefiles**. This file can be found in the same folder in which the **SURPAC** Software is installed.*

I have done a few simple tests and the application seems to work well, is simple to use and produces the desired results.

Using this application, a **Shapefile** for the African continent, for example, can be converted into **DXF** and then loaded into a **SURPAC General CAD** Sheet, as shown here.

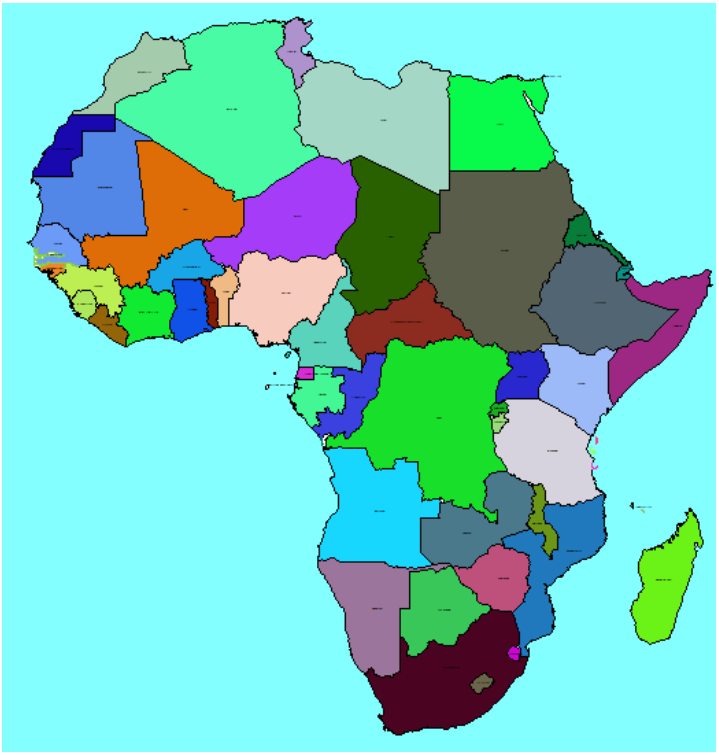
Using the "Fill" Commands

The **General CAD** programme includes commands for **Filling** a User defined area, or polygon. The area can be any closed figure, bounded by lines of any colour. The boundary lines can be a figure created from a series of straight lines, be a closed set of connected spline curves, or be a closed figure created by using the **Sketch** mode. When **Filling** the figure with a colour,

you may select either the current **Hatch Colour**, or a colour selected at **Random** by the programme.

Any **Filled** area may be **Deleted** at any stage. If you are going to delete both the **Fill** colour and the figure itself, make sure that the bounding figure is deleted before deleting the **Fill** colour.

The display of **Filled** areas may be turned on, or off, at any stage. Note, that when **Printing** a **General CAD** Sheet, the **Filled** areas cannot be directly printed. In order to create a hard copy output of a Sheet containing **Filled** areas, first create a Graphic image (.jpg, .tif etc.) of the Sheet from **SURPAC**, then use any image printing software to print the image.



Using the **Fill** option with **Random Colours**, the map of Africa displayed above (imported from a **Shapefile** that has been converted to a **DXF** file), can now be displayed in colour.

General SURPAC Information & Modifications

Checking for the latest SURPAC Upgrade – From time to time, intermediate Upgrades are made to **SURPAC** Software and these are loaded onto the **www.surpac.co.za** web site. These intermediate changes are not sent out for general notification and the Version number does not change.

However, you can at any time check to see if there is a newer version of **SURPAC** available than the one you are running by loading the above web page and then allowing the cursor to hover over the **[Download the Latest SURPAC Upgrade]** button. The latest **SURPAC** Version and the date of its release will be displayed. If you have a valid Software Maintenance Contract, you can then download and install this intermediate Upgrade, as explained on Page1.

Running SURPAC from a Co-ordinate File Icon – You are able to run **SURPAC** by double clicking on the icon of any **SURPAC Co-ordinate file** (***.wcr** file). From ***Windows Explorer***, display the folder containing the required **Co-ordinate File** and double click its icon. **SURPAC** will then load and display this file as the current **Co-ordinate File**.
Standard Helmert Transformations – Transforming non-common Points. When **Saving** the transformed Points to the current Co-ordinate File, you now have the further option of changing the **Name** of the Point to be stored, if another Point with the same Name pre-exists in

the file. For example, if a Point named **A34** is being transformed and a Point A34 already exists you have the following options :-

- Reject the transformed values and keep the existing values
- Overwrite the existing values with the transformed values
- Adopt the means of the existing values and the transformed values
- Change the Name of the transformed Point (e.g. **A34x**) and Save this as a new Point, thereby retaining both sets of values.

Tacheometric file Editing – There was a problem with the "**Remove Duplicate Point**" function when trying to remove/delete Points in a Tacheometric file, within a User given radius of an existing Point. This problem has now been fixed up.

General CAD Programme – 1. There was a problem when **Naming Points** using either the **N1**, **N4** or **N7** commands. The **Point Names** were overwriting the **Point Mark** when the **Mark Point Display Size** was held constant. *(Refer to discussion below).*

2. When importing **Google Earth** or **1:50000** map sheet, whose orientation needed to be corrected for **Meridian Convergence**, the programme was applying the incorrect Convergence for the **UTM Zone** system. This has now been corrected.

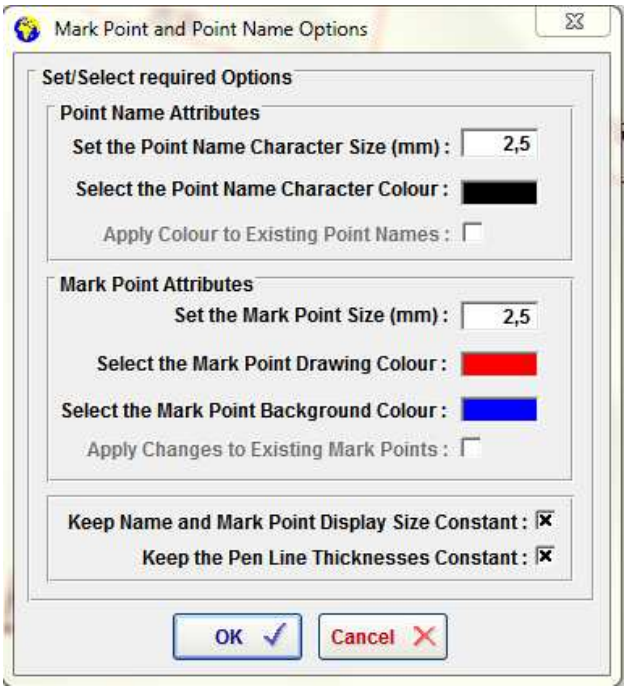
3. Auto-importing of **Geo-Referenced Images** which are referenced by **Latitude** and **Longitude** (rather than the more usual Y, X values) has been added.

Discussion : Screen Displayed Line Thicknesses & Name Sizes – All **CAD** programmes in **SURPAC** have the option of keeping the screen display of drawn Lines at a standard (thin) thickness, or to vary the line thicknesses as the display is zoomed in or out.

The **General CAD** programme and the **Contour Generation and Plotting** programme both have the facility to either hold the size of Point **Names** (or **Spot Height** values) to a standard (2.5mm) size regardless of display scale, or to vary the **Name** (or **Spot Height**) size as the display is zoomed in or out. Keeping the **Name** (or **Spot Height**) size constant is useful when an area is cluttered with Points and you need to zoom in to an area for more clarity.

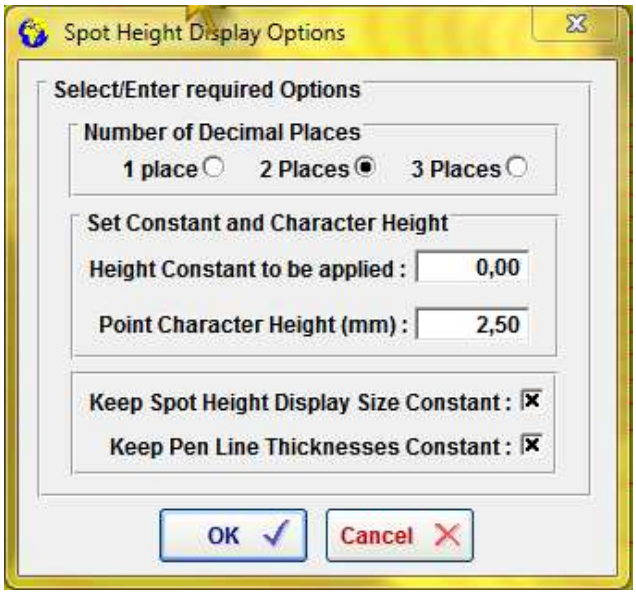
To set these options in the various **CAD** programmes :-

- **General CAD** programme – Click on the "**Mark Pnt**" menu heading, then select the "**Set Mark Point Options** …" menu item.


Mark Point and Point Name Options
Set/Select required Options
Point Name Attributes
Set the Point Name Character Size (mm) :
2,5
Select the Point Name Character Colour :
Apply Colour to Existing Point Names :
Mark Point Attributes
Set the Mark Point Size (mm) :
2,5
Select the Mark Point Drawing Colour :
Select the Mark Point Background Colour :
Apply Changes to Existing Mark Points :
Keep Name and Mark Point Display Size Constant :
Keep the Pen Line Thicknesses Constant :
OK
Cancel

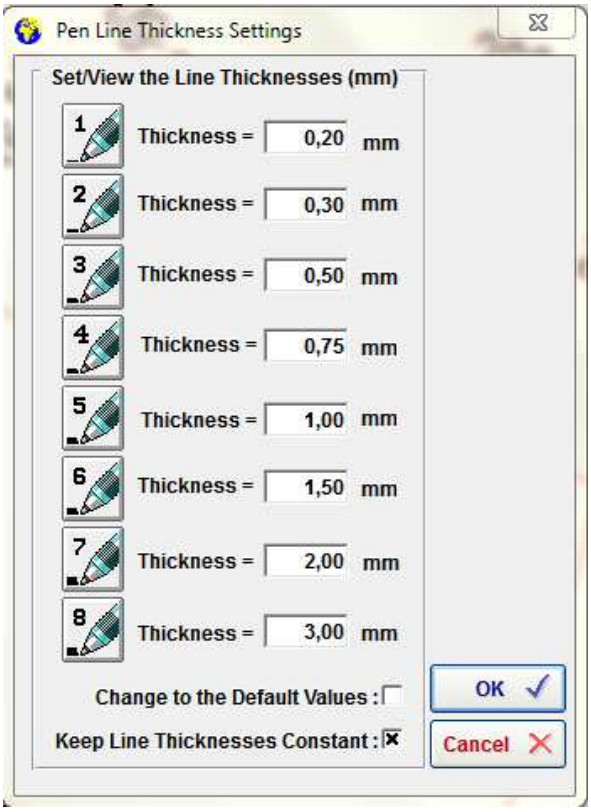
At the bottom of the displayed form you can select, or de-select both the **Point Display Size** and the **Line Thickness Display** options.

- **Contour Generating and Plotting CAD** programme – Click on the "**Edit**" menu heading, then select the "**Change the Pen Thickness Values**" menu item.



At the bottom of the displayed form you can select, or de-select both the **Spot Height Display Size** and the **Line Thickness Display** options.

- **General Plan**, **GP Data Sheet**, **Diagram**, **Sectional Title** and **Working Plan CAD** programmes – Click on the "**Edit**" menu heading, then select the "**Set Pen (Line) Thicknesses**" menu item.


Pen Line Thickness Settings
Set/View the Line Thicknesses (mm)
1 Thickness = 0,20 mm
2 Thickness = 0,30 mm
3 Thickness = 0,50 mm
4 Thickness = 0,75 mm
5 Thickness = 1,00 mm
6 Thickness = 1,50 mm
7 Thickness = 2,00 mm
8 Thickness = 3,00 mm
Change to the Default Values :
Keep Line Thicknesses Constant :
OK
Cancel

At the bottom of the displayed form you can select, or de-select the **Line Thickness Display** option.

Co-ordinate File Editing – The top, left hand grid cell of the **Co-ordinate File** display can be used as a **"Highlight All"**, or **"Mark All"** function. This is the cell to the left of the "**Constants**:" display and which contains the small, downward arrow. Clicking in this cell will cause all Points to

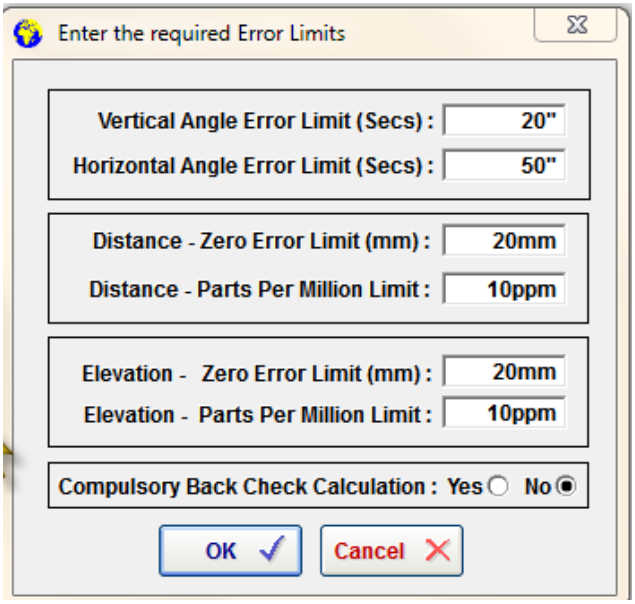
be **Highlighted**. *(Note that this produces the same result as selecting any one Point and then, with the cursor still in the grid display area, pressing the [**Ctrl**] + [**A**] keyboard keys.)*

If you then want to **Delete** all the file's existing Points, for example, then click the small check box under the green arrow and select the option "**Delete Point(s)**". The file will be cleared and purged.

Or, if you want to **Copy** all Points in the file, click the small check box under the green arrow and select the option "**Copy Point(s)**". All Points will be placed into the ***Windows*** Clipboard.

Diagram CAD Programme – The **Line intersect** function has been added to the **Diagram CAD** programme. Users are now able to use the **Line Arc Intersect** (**LIA**), **Line Point Intersect** (**LIP**), **Line Splay Intersect** (**LIS**) and **Line Parallel Check** (**LIC**) Commands, as used in the General CAD and General Plan CAD programmes.

Mining : Peg Fixing – Applying Error Limits - There was an inconsistency in the error checking routine for this programme, as follows :-


Enter the required Error Limits
Vertical Angle Error Limit (Secs) : 20"
Horizontal Angle Error Limit (Secs) : 50"
Distance - Zero Error Limit (mm) : 20mm
Distance - Parts Per Million Limit : 10ppm
Elevation - Zero Error Limit (mm) : 20mm
Elevation - Parts Per Million Limit : 10ppm
Compulsory Back Check Calculation : Yes No
OK
Cancel

The **Horizontal Distance** check routine calculates the difference between the two measured distances and then compares this difference against the defined allowable limit (see above form).

However, the **Vertical Distance** (**Height**) check routine was calculating the mean of the two measured Vertical Heights and then checked to see if either of the measured Heights differs from the mean Height by more than the defined allowable limit. Hence the difference between the two measured heights could differ by up to twice the defined limit.

In order to bring both check methods in line, the **Vertical Height** limit check routine has been changed to use the same procedure as the Horizontal Distance checking, as this is the more intuitive solution.

SURPAC for Windows XP/Vista/7 Version 5.37, Release 03

SURPAC Modifications

There are only a few changes for this Upgrade, however they are all are important changes :-

SURPAC Support for AutoCAD Version 2012 DF ad DWG files – **SURPAC** is now able to Import **DXF** ad **DWG** files created using **AutoCAD Version 2012**, or compatible software. The importing of hatched polygons has also been improved.

Modified Graphic Image Printing – The printing of graphic images, including inserted signatures on Cadastral CAD sheets, has been improved. Both the positioning of the images relative to the line and text items is more precise and the quality of the printed image has been enhanced. This applies to both direct printer/plotter outputs and to **PDF** outputs.

Diagram A3 Printing – The **Diagram CAD** programme was not correctly printing **A3** diagrams when outputting to diagram to an **A4** printer. This has now been rectified, for both direct printer output and for PDF output.

SURPAC General CAD Programme

New Layering System

The **Layer** system in the **General CAD** Programme is directly linked to the **Beacon**/**Point Description** List.

For Co-ordinate files using the **Cadastral** format, there are **55** Beacon Descriptions available, hence a **General CAD** Sheet using this format will have **55** Layers available.

For Co-ordinate files using the **Engineering** format, the Layer system is more flexible and there are **300 Layers** available for a **General CAD** Sheet when using this format.

In the **Cadastral** format, Layers are identified by number (1 – 55). The **Layer Description** is then that of the Beacon Description corresponding to that number.

In the **Engineering** format, Layers are identified by either numbers (1 -300), or by a **Layer ID**. A **Layer ID** may be up to 8 characters in length. A **Layer ID** typically is a cryptic description of the Point surveyed. For example, "**PL 33**" could refer to a 33Kw power line pylon.

Default Point/Layer Descriptions

When creating a new Co-ordinate file, a set of default descriptions will be loaded for both the Points and, therefore, the **General CAD Layers**.

Cadastral format Co-ordinate File

For a **Cadastral** format **Co-ordinate** file, the default **Cadastral** descriptions will be loaded. These default descriptions are held in the file called "**Standard**.**wcd**" and is stored in the **SURPAC** installation folder. This description list consists of **55** descriptions, segmented as follows :-

Descriptions 01 – 28 : Beacon Descriptions, which may be User defined. The only exception is **Description 22** which is normally retained to be "**Not Beaconed (Calculated Points)**".
Description 29 : "**Reference Marks**"
Description 30 : "**Outside Figure Points (Township)**"
Descriptions 31 - 33 : "**Trigonometrical Beacons**"
Description 34 : "**Town Survey Marks**"
Descriptions 35 - 55 : "**Working Stations**"

*(Refer to the **SURPAC** electronic Help pages, via the [**F1**] Special Function Key, and read the topic "**Beacon Description List**" found under the heading "**SURPAC Lite Module**" for details on using this format Description file.)*

Engineering format Co-ordinate File

For an **Engineering** format **Co-ordinate** file, the default **Engineering** descriptions will be loaded. These default descriptions are held in the file called "**Standard**.**wed**" and is stored in the **SURPAC** installation folder. This description list consists of **300** descriptions which are User definable.

Layer Properties

A **Layer** has the following properties :-

Layer identifying (ID) Number : This number ranges from 1 to 55 for **Cadastral** format Co-ordinate files and from 1 to 300 for **Engineering** format files. For **Engineering** format files, **Layers** can be further identified by their **Layer ID**, a 1 to 8 character text item related to the Layer's contents.

Layer Description : This is a fuller Description of the **Layer** contents and is the same as the Point Description used, i.e. there is full compatibility between Point Descriptions and Layer Descriptions. Changing a Layer Description, for example, will cause the corresponding Point Description to be changed as well. In order for a Layer to be used, it must have a **Description**. For **Engineering** format Co-ordinate files, the **Layer ID** must also be defined.

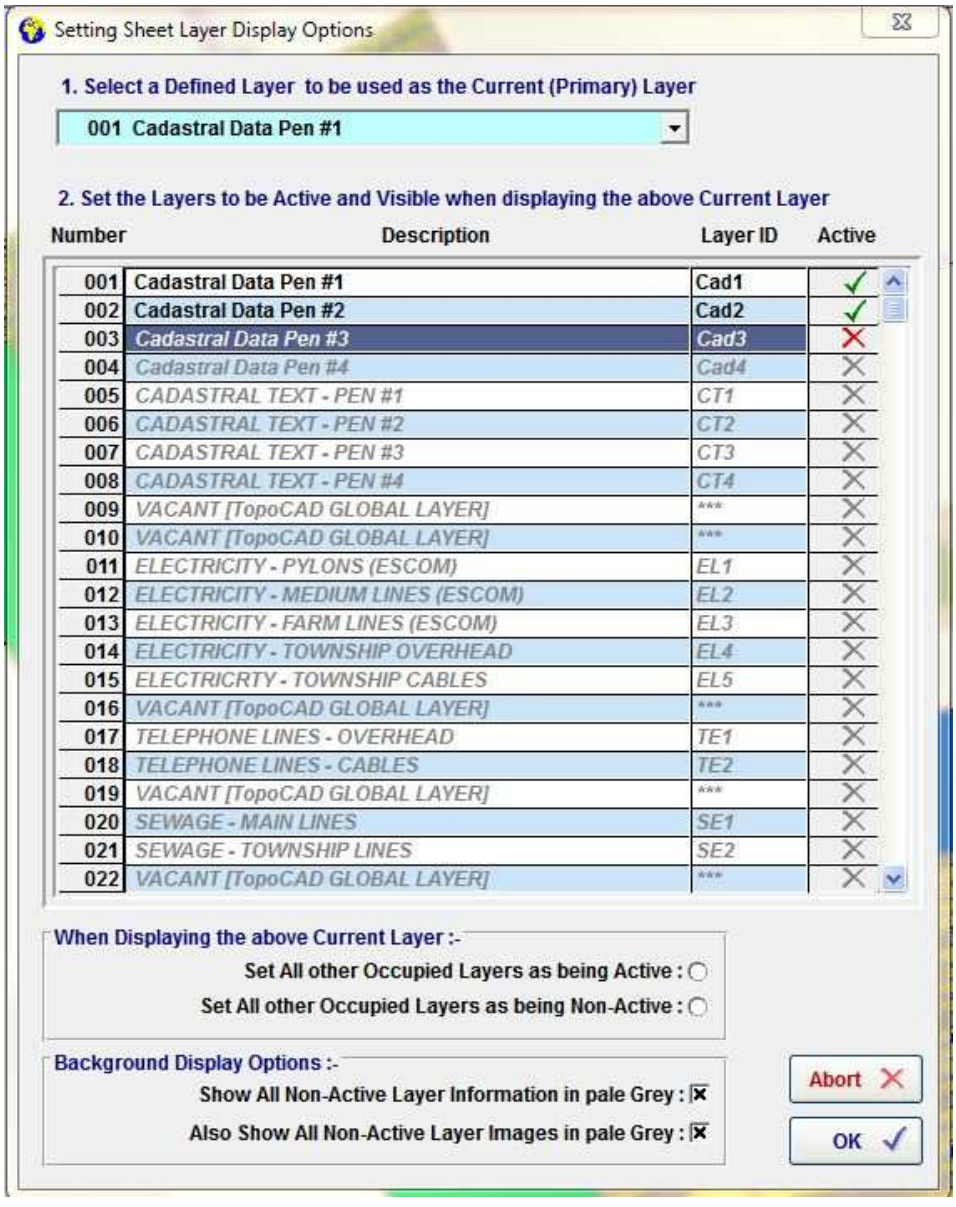
Layer Colour : Each Layer is allocated a colour. The colour options consist of the basic 14 RGB colours, plus a series of colours emulating the colour sequence as used in **AutoCAD**. This is to help maintain compatibility with imported **DXF** and **DWG** files. When creating a new Co-ordinate file, default colours are assigned to each Layer. These colours can be User modified.

NB : *To maintain compatibility with the previous versions of the **SURPAC General CAD** programme, basic colours such as **Black**, **Red**, **Blue**, **Green** etc. are allocated to the first 14 Layers of a newly created Co-ordinate file. When a previously created **General CAD** Sheet is loaded in the current version of the programme, all Lines, Text etc. using Pen #1 (**Black**) will be allocated to Layer #1. All Lines, Text etc. using Pen #2 (**Red**) will be allocated to Layer #2, etc.*

A Defined Layer : A **Defined Layer** is a Layer that has a defined **Layer Description** and, for an **Engineering** format Co-ordinate files, a defined **Layer ID**.

An Occupied Layer : An **Occupied Layer** is a **Defined Layer** which contains any drawing elements, such as **Lines**, **Arcs**, **Circles**, **Text**, **Points**, **Topo Symbols**, **Images**, **Figure Hatching** or **Figure Flood** items.

The Current Layer : The **Current Layer** is the Layer which is currently defined as the primary drawing Layer. The **Current** Layer is displayed in the **Layer List box** at the top of the Sheet drawing area. The **Layer List box** contains a list of all the **Defined Layers** for the current Sheet. By clicking on the small down arrow next to the **Layer List box**, you can select any other **Defined Layer** to be the new **Current Layer**.


Setting Sheet Layer Display Options
1. Select a Defined Layer to be used as the Current (Primary) Layer
001 Cadastral Data Pen #1
2. Set the Layers to be Active and Visible when displaying the above Current Layer
Number
Description
Layer ID
Active
001 Cadastral Data Pen #1 Cad1
002 Cadastral Data Pen #2 Cad2
003 Cadastral Data Pen #3 Cad3
004 Cadastral Data Pen #4 Cad4
005 CADASTRAL TEXT - PEN #1 CT1
006 CADASTRAL TEXT - PEN #2 CT2
007 CADASTRAL TEXT - PEN #3 CT3
008 CADASTRAL TEXT - PEN #4 CT4
009 VACANT [TopoCAD GLOBAL LAYER] ***
010 VACANT [TopoCAD GLOBAL LAYER] ***
011 ELECTRICITY - PYLONS (ESCOM) EL1
012 ELECTRICITY - MEDIUM LINES (ESCOM) EL2
013 ELECTRICITY - FARM LINES (ESCOM) EL3
014 ELECTRICITY - TOWNSHIP OVERHEAD EL4
015 ELECTRICRTY - TOWNSHIP CABLES EL5
016 VACANT [TopoCAD GLOBAL LAYER] ***
017 TELEPHONE LINES - OVERHEAD TE1
018 TELEPHONE LINES - CABLES TE2
019 VACANT [TopoCAD GLOBAL LAYER] ***
020 SEWAGE - MAIN LINES SE1
021 SEWAGE - TOWNSHIP LINES SE2
022 VACANT [TopoCAD GLOBAL LAYER] ***
When Displaying the above Current Layer :-
Set All other Occupied Layers as being Active :
Set All other Occupied Layers as being Non-Active :
Background Display Options :-
Show All Non-Active Layer Information in pale Grey :
Also Show All Non-Active Layer Images in pale Grey :
Abort
OK

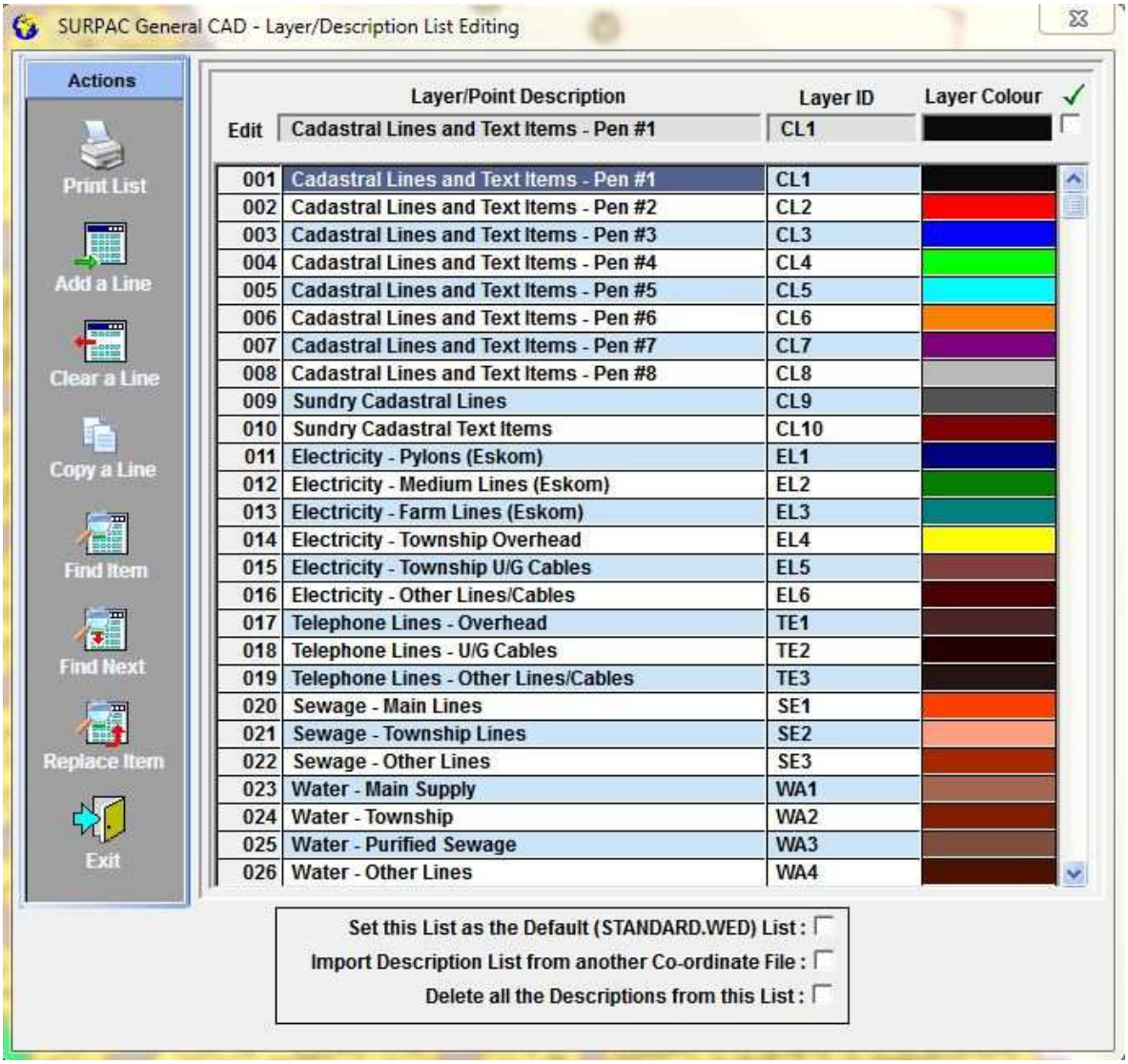
Layer Active Property: A **Layer** may be defined as being either **Active**, or **Non-Active**. The **Current Layer** is always **Active**. Any of the other **Defined Layers** may be set as **Active** via the **Change Layers and/or Active Settings** menu item, found under the **Layers** menu heading. The keyboard short cut key to this function is [**F3**] (the **F3** Special Function Key).

Using this function you can :-

- Change the **Current Layer** to any of the **Defined Layers**.
- Individually set the other **Defined Layers** that are to be either **Active** or **Non-Active**.
- Set **All Defined Layers** as being **Active**.
- Set **All Defined Layers** (other than the Current **Layer**) as being **Non-Active**.

For **Non-Active Layers** you can specify whether the information on these **Layers** is to be made invisible, or to be displayed in a pale grey colour. In the latter case, the displayed data is regarded as **Background** information. When **Non-Active Layer** information is set as **Background** information the items on these **Layers** cannot be edited or deleted. A further option allows you to display **Images** on **Non-Active Layers** as pale grey images, if required.

Setting the Layer Descriptions and Colours


SURPAC General CAD - Layer/Description List Editing
Actions
Print List
Add a Line
Clear a Line
Copy a Line
Find Item
Find Next
Replace Item
Exit
Layer/Point Description
Layer ID
Layer Colour
Edit
Cadastral Lines and Text Items - Pen #1
CL1
001 Cadastral Lines and Text Items - Pen #1 CL1
002 Cadastral Lines and Text Items - Pen #2 CL2
003 Cadastral Lines and Text Items - Pen #3 CL3
004 Cadastral Lines and Text Items - Pen #4 CL4
005 Cadastral Lines and Text Items - Pen #5 CL5
006 Cadastral Lines and Text Items - Pen #6 CL6
007 Cadastral Lines and Text Items - Pen #7 CL7
008 Cadastral Lines and Text Items - Pen #8 CL8
009 Sundry Cadastral Lines CL9
010 Sundry Cadastral Text Items CL10
011 Electricity - Pylons (Eskom) EL1
012 Electricity - Medium Lines (Eskom) EL2
013 Electricity - Farm Lines (Eskom) EL3
014 Electricity - Township Overhead EL4
015 Electricity - Township U/G Cables EL5
016 Electricity - Other Lines/Cables EL6
017 Telephone Lines - Overhead TE1
018 Telephone Lines - U/G Cables TE2
019 Telephone Lines - Other Lines/Cables TE3
020 Sewage - Main Lines SE1
021 Sewage - Township Lines SE2
022 Sewage - Other Lines SE3
023 Water - Main Supply WA1
024 Water - Township WA2
025 Water - Purified Sewage WA3
026 Water - Other Lines WA4
Set this List as the Default (STANDARD.WED) List :
Import Description List from another Co-ordinate File :
Delete all the Descriptions from this List :

Layer Descriptions and Colours may be entered or modified via the **Set the Layer Descriptions & Colours** menu item, found under the **Layers** menu heading. The keyboard short cut key to this function is [**F4**] (the **F4** Special Function Key).

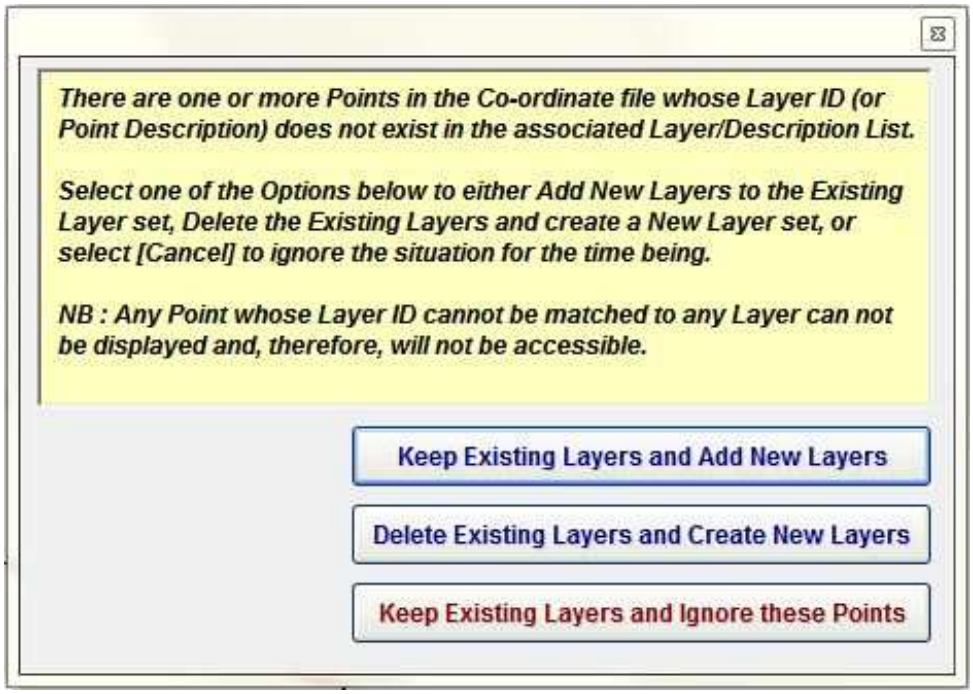
When using a newly created **Co-ordinate file**, the default **Description/Layer List** (either **Cadastral** or **Engineering**) will be loaded.

Using the Engineering format - The first time a **General CAD** Sheet is loaded, the programme will check to see if there are any **Point/Layer ID** values in the Co-ordinate file that do not match any existing **Layer ID** for the current Sheet.

NB : *When displaying the file Points in the **Co-ordinate file Editing** programme, the **Point/Layer ID** is shown under the **Description** heading.*

In order for all file **Points** to be displayable, their **Layer ID** must exist in the list of Descriptions for the current **CAD** Sheet. Using the [**F4**] function (see above) will solve this problem, should such Points exist.

Using this method provides the User the flexibility of setting up their own **Layer/Description** List, rather than making their surveyed Points comply with the built in, default values used in **SURPAC**.


There are one or more Points in the Co-ordinate file whose Layer ID (or Point Description) does not exist in the associated Layer/Description List.
Select one of the Options below to either Add New Layers to the Existing Layer set, Delete the Existing Layers and create a New Layer set, or select [Cancel] to ignore the situation for the time being.
NB : Any Point whose Layer ID cannot be matched to any Layer can not be displayed and, therefore, will not be accessible.
Keep Existing Layers and Add New Layers
Delete Existing Layers and Create New Layers
Keep Existing Layers and Ignore these Points

Importing and Exporting Layer information on a General CAD Sheet

When importing information from an **AutoCAD DXF** or **DWG** file, the **Layer Headings** and **Colours** as used in the **DXF** or **DWG** file will be replicated for the **CAD** Sheet, if this is required. Other options allow all imported **Layer** information to be put into the **Current Layer**. The **Layer Colours** in the **DXF** or **DWG** file can also be overridden and the existing **Layer colours** in the **CAD** Sheet maintained.

A **CAD** Sheet's **Layer Headings** and **Colours** may be exported to **DXF** or **DWG** files. When exporting information, only data on the **Active Layers** will be exported. No **Layer** information for **Layers** shown as **Background** on the screen will be sent to the **DXF** or **DWG** file.

Layer information can also be imported in a similar fashion from **TopoCAD CAD** software.

Layer Elements

The **Layer** elements, such as **Lines**, **Arcs**, **Circles**, **Text** items all adopt the **Colour** of the **Layer** on which they are created, or copied. **Lines** may also have individual width and style features. **Text** items may have individual font, style and size features.

Images are **Layer** specific. If you have different **Images** loaded on different Layers, then these images can be turned **On** or **Off** along with the **Layer Activation**. For example, you might have a **Google Earth Image** loaded on one **Layer** and a **1 : 50 000 Image** on another **Layer**. These **Images** may then be viewed separately, by changing the **Layer Activation**, or if they do not overlap they can be displayed together.

Points will only be displayed for those **Layers** that are currently **Active**. All other Points will not be visible nor addressable by the software.
*Note - even if the "Background in Grey" option (using the [**F3**] function) has been set, Points on **non-Active Layers** will not be visible.*

Separating **Points** into **Layers** makes **Line** drawing for surveyed features easier and less likely to cause error. For example, if a **Layer** has been used for **Fence** Points then, when this **Layer** is made **Active** with all other Layers being non-Active, only **Points** with the appropriate **Fence** points will be displayed. Hence, when constructing **Lines** connecting these **Points**, it will not be possible to inadvertently connect a Fence Point to say, a Power Pole Point.

By separating **Cadastral** information, the **General CAD Sheet** can be used for a **Comparison Sketch** drawing. For example, if all **Found** beacons are put on a **Layer** that does not have any **Placed** beacons, then this **Layer** can be displayed, with all other **Layers Non-Active**, and the **Sides** and **Directions** of the boundary lines written in (using the Auto Write function). The **Placed** beacon **Layers** can then be made **Active** and the **Found** beacon **Layer** set as **Non-Active**, and again the Sides and directions between the Placed beacons can be written, so as to display the different data between the Found and Placed beacon values.

The **Menu** layout for the **General CAD** Programme has been restructured into a more logical, alphabetical order. The **Figure** Commands have been placed under a separate heading and the **Figure Fit** function has been added.

Finally, the **General CAD** programme produced an error when using the **Line Generate** function. This occurred when multiple use was made of the **[+90]** or **[-90]** buttons were used to set the directions for a series of contiguous Lines. This has now been fifed up.

Other SURPAC Modifications

Diagram CAD Programme – The area available for figure construction on **A3 diagrams** has been enlarged. This is to help accommodate figures that need to be swung (re-oriented) and to prevent elements of the figure from exceeding the drawing limits.

Point Off-Line calculations – The programme was not storing the newly calculated On-Line points correctly and was, in some case, overwriting other existing points. This has now been rectified.

Co-ordinate File Heading Information – The heading of **Survey Record** has been added to the list of available headings for the two available **Label Fields** in the **Co-ordinate File Editing** programme.

Mining Underground Peg Fixing programmes – These programmes will now check the **Face Left** and **Face Right** angle values computed for **Arc #1**, before **ARC #2** is entered. If these values differ by more than the set **Horizontal Angle Limit**, a warning will be displayed and the

values checked and/or re-entered before continuing. *A reminder to all Users of the **Mining U/G Peg Fixing** programmes – the default Password for changing the Limit settings is **ABCD1234***.

Co-ordinate File Listing – There was a bit of glitch in the Co-ordinate file listing when points with names of "**N**" and "**P**" were used. Due to a routine that tried to prevent the use of "**O**" as a point Name, the programme was deleting point "**P**" whenever point "**N**" was edited. This has now been rectified.

Opening/Creating a new Co-ordinate file – When opening a new **Co-ordinate file**, Users are able to **Create a new Folder**, or **Delete an existing Folder** by making a Right Click on the "**C:**" folder Icon (or the root directory). In the previous upgrade of **SURPAC** this feature inadvertently became disabled, but it has now been re-instated.

A discussion on Image Importing and Printing – **SURPAC** will import and use images in **BMP**, **JPG** and **TIFF** (**TIF**) formats. However, **TIFF** is not as standard a format as first appears. There are different compression techniques that can be applied to a **TIFF** image and these obviously effect the size of the image produced.

Although **SURPAC** is able to import and manipulate images in excess of **65Mb**, it is only able to output (print) images up to about **50Mb**. This limit cannot be modified at present as the computer language used to write the software will not allow for a larger image to be printed.

For most survey plan printing requirements, this **50Mb** limit is quite adequate. However, if a **TIFF** file has been compressed using some extra compression technique (there are about 7 of them), then the shown file size is misleading and a **TIFF** file may actually be up to 4 times larger than its displayed (compressed) size.

For example, I used a 1:50000 Degree Sheet **TIFF** file which had a nominal size of 15.4Mb. On the face of it, this is well within the limit of 50Mb and should be OK. The file was loaded as a background image for a **General CAD** sheet and then this sheet was printed to **PDF**. The output of the image was entirely distorted. I then imported this 1:50000 Degree Sheet **TIFF** image into a graphics application called "**IrfanView**" *(if you don't already have this useful little programme, you can download for free - just Google it)* to open and then re-saved it in standard, non-compressed **TIFF** format. The size of the file now ballooned to **65Mb**, thereby causing the problem in **SURPAC** when trying to print.

You can use **IrfanView** (or any other graphics software) to half the number of pixels in the file, and re-saved the image in standard **TIFF** format. Doing this to the above example produced a file of **48.5Mb**. I repeated the exercise of importing the file into the **General CAD** sheet and again plotted the sheet to a **PDF** file. The image on the resulting **PDF** file was now correctly positioned and scaled..

A word of caution - When using **Geo-Referenced images**, you need to adjust the image file's associated ***.tfw** file, where *** is the name of the image to be imported. This file contains the position values and scaling factors required to automatically place and size an imported image. A ***.tfw file** (which is a text file) could for example look like this :-

1.1000106
0
0
-1.1000106
65083.701875737628 *(NB : The last two values can be in either Y, X in Metres or in Lat, Long)*
-2843626.040160913000

The 1st and 4th values represent the Metres-per-pixel for Y and X directions, respectively. Where the problem arises is if you RESIZE the image by using a graphic editing application (as discussed above), then these two values must be reset. For example, if you resize the image to 50% of its original size, then you need to double the Metres-per-pixel values in order to retain the correct scaling.

Hence, the above should now look like :-

2.2000212
0
0
-2.2000212
65083.701875737628
-2843626.040160913000

Modify the *****.tfw** file as mentioned above before import the image into **SURPAC General CAD**.

SURPAC for Windows XP/Vista/7/8 Version 5.40, Release 01

SURPAC Support for the Windows 8 Operating System

SURPAC Version 5.40 has been optimized to run under both the ***Microsoft*** **Windows 7** and ***Microsoft*** **Windows 8** operating systems, but will also run under **Windows Vista** and **Windows XP**. Please note that earlier versions of **SURPAC** will not run under **Windows 8**.

When installing **SURPAC**, or a **SURPAC** Upgrade under **Windows 8**, it may be necessary to carry out the installation using the "**Run as administrator**" option. To do this, right click on the installation file's icon, then select this option from the pop-up menu that will be displayed.

SURPAC Intermediate Upgrades

Intermediate modifications are sometimes made to **SURPAC** in between the main Upgrades. These modifications, in general, do not warrant a complete Upgrade of the software, but in order to keep your **SURPAC** up to date, you should download and install these intermediate modifications.

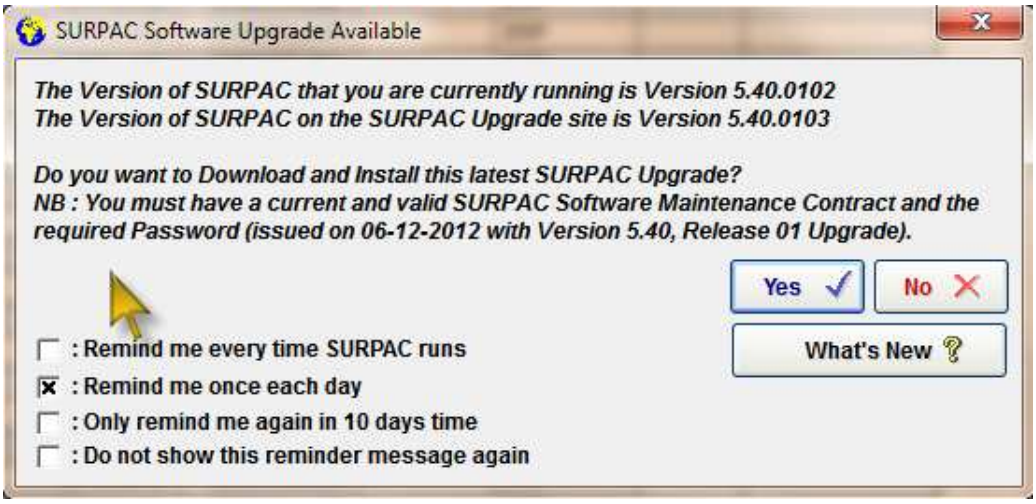
The version number would be something like **5.40.0103**, indicating that the modified Upgrade file represents modification **03** of the official release called **Version 5.40**, **Release 01**.

Normally, a new **User Name** and **Password** are not required. Unless otherwise stated, you can use the User Name and Password issued for the last official Upgrade, e.g. with Version 5.40, Release 01.

Before downloading and installing the intermediate modification(s), you can view these changes and decide if they affect you.

When **SURPAC** displays the form below, you can :-

1. Click the [**What's New**] button to see what changes have been made.
2. Select the **reminder** interval required for Upgrade checks.
3. Click the [**Yes**] button if you want to install the Upgraded version of **SURPAC**, or
4. Click the [**No**] button if you want to ignore these Upgrades for the time being.


SURPAC Software Upgrade Available
The Version of SURPAC that you are currently running is Version 5.40.0102
The Version of SURPAC on the SURPAC Upgrade site is Version 5.40.0103
Do you want to Download and Install this latest SURPAC Upgrade?
NB : You must have a current and valid SURPAC Software Maintenance Contract and the required Password (issued on 06-12-2012 with Version 5.40, Release 01 Upgrade).
Yes
No
What's New
: Remind me every time SURPAC runs
: Remind me once each day
: Only remind me again in 10 days time
: Do not show this reminder message again

General CAD and General Plan CAD Programmes

Check for Lines whose Terminals are not correctly Trimmed or Snapped - This new function (**[LC] – Line - Check Trimmed**) allows for the display of all **Line Terminals** that have not been trimmed, (or snapped) to intersect another **Line** lying close to the **Terminal**. ***Line Trimming*** *implies that the* ***Line*** *under consideration terminates at the true intersection of this* ***Line*** *and any other* ***Line*** *where the graphical intersection is less than 1.00m.* The function will scan the entire Sheet, checking all **Lines** for non-Trimmed **Terminals**. Any other **Line** that lies within 1.00m of the **Terminal** will be checked for **Line Trimming**. If the current intersection position is found to be within this limit of 1.00m, but exceeds 0.001m, then this **Line Terminal** will be highlighted by displaying a purple dot over it. All such highlighted Line Terminals can then be investigated and/or corrected using the **[LT] – Line Trim/Snap** command, for example.

For the **General CAD** Programme, only **Lines** lying in **Active Layers** (i.e. visible and non-greyed Lines) are considered for this function.

Delete Duplicate Lines/Arcs – This new function will search the Sheet's **Line** file and check for, and remove, any **Line** duplication. **Line** duplication is defined by any two **Lines** having the same **Terminal** values, within a tolerance of 0.005m. The **Line** colours, Style and Thickness are immaterial to this function. The function applies to both **Lines** and **Arcs**. After running this function, the number of Deleted Duplicate Lines (if any) will be displayed.

Transformations to/from Clarke 1880 (Modified) and WGS 1984 Ellipsoids

South Africa – Nothing has changed for this country. The data base of Trig. Beacon and TSM co-ordinates for both systems remains that as supplied by the Chief Directorate : National Geo-spatial Information, Mowbray. The **WGS 1984** values ("**WG**" values) are the Hartebeeshoek94 Datum values as supplied in 2005. The **Clarke 1880** (**Modified**) values ("**Lo**" values) are the last issued values dated 1995 – 1998, depending on the area.

Transformation between the two systems in South Africa is of a high order of accuracy, normally in the region of ±0.03m. This is due to the large number of common points covering the country (in the order of 50,000). The Standard Deviations shown for transformed points are due more to the effects of the re-adjustment of the Hartebeeshoek94, rather than to any transformation uncertainty.

There has been some discussion recently on the use by ***SURPAC*** *of the term "****WG****" for the Hartebeeshoek94 system, e.g. "****WG 27****". I have used the term "WG xx" in* ***SURPAC*** *instead of official "Lo84/xx". My reason for this was to try to visually emphasize in which of the two systems the current file lies. Many non-Surveyors use information shown on Diagrams and co-ordinate lists, and the significance of the difference between "Lo 27" and "Lo 84/27" could be lost on people without a survey training background. Nonetheless,* ***SURPAC*** *does allow Users to change the headings of co-ordinate file lists, GPs, Diagrams etc., so that headings such as "WG 27" can be changed to "Lo 84/27", should this be required when submitting official documentation.*

Zimbabwe – This country has now been added. A data base has been set up using the available **Clarke 1880** (**Modified**) (i.e. the **Arc 1950**) values and the **WGS 1984** values. Unfortunately, we have only been supplied with a limited amount of information consisting of about 1,600 common Trig. Beacons in the two systems. Sample transformations indicate a **Standard Deviation** for the transformations between the two systems to be in the order of **±0.25m**. At this stage, therefore, transformed values are not sufficiently accurate for use for official applications, such as Diagram or GP compilations. However, the transformed values can be used for :-
Beacon relocation purposes,
Approximate calculations of areas etc.,

Small scale mapping,
Google Earth information display,

This data base will be updated as and when further information becomes available.

Zambia – This country has **also** been added**.** As for Zimbabwe, a data base has been set up using the available **Clarke 1880** (**Modified**) (i.e. the **Arc 1950**) values and the derived **WGS 1984** values.

The Zambian **WGS 1984** values were obtained, through **SURPAC**, using a combination of a simultaneous Molodensky-Badekas transformation, anchored by a Helmert transformation based on 16 common points with known **WGS 1984** values. Subsequent sample transformations indicate a **Standard Deviation** for the transformations between the two systems to be in the order of **±2.0m**. At this stage, therefore, transformed values are not sufficiently accurate for use for official applications, such as Diagram or GP compilations. Using these data for beacon relocations would provide only approximate positions. However, the transformed values can be used for :-
Approximate calculations of areas etc.,
Small scale mapping,
Google Earth information display,

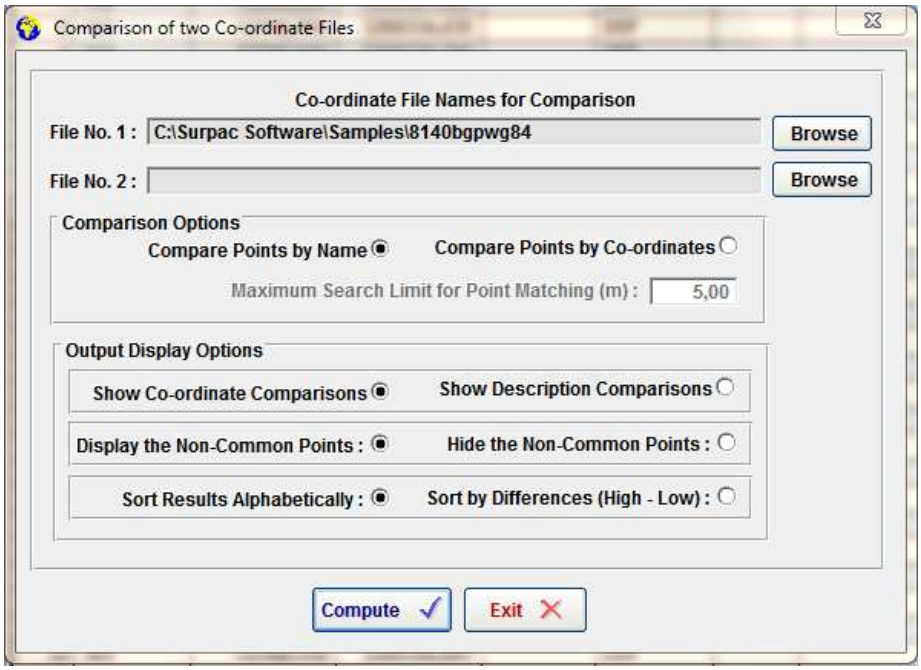
This data base will be updated as and when further information becomes available.

Other Countries – The appropriate authorities in other Southern African countries have been approached regarding the supply of data. Swaziland apparently does not have any WGS 1984 data for its Trig. Network. To date, Namibia, Botswana, Lesotho and Malawi have not responded to our request. If, or when, we receive sufficient and reliable data for these countries, they will be added to the transformation list.

Locate and Add Nearest Trig/TSM Beacons

The above discussion applies to this programme. **Zimbabwe** and **Zambia** have been added to the list of countries where this programme is active. The same warnings and limitations to these latter countries apply when adding Trig Beacons in the **WGS 1984** system, i.e. for **Zimbabwe** an accuracy of **±0.25m** is applicable and for Zambia the accuracy drops to **±2.0m**. For the **Arc 1950** system, the values shown are the official Trig. Beacon values.

Point Comparisons using different Files



Two new features have been added to this programme.

First, it is possible to display the list of comparisons in alphanumeric order, which is the existing method, or in order of magnitude of the linear difference between respective points. Selecting this latter option will display the list from the largest difference to the smallest difference.

Secondly, the display of the non-common points between the two files may be ignored. Obviously, there are instances where the display of the non-common points is necessary and important. However, if only the comparison of common points needs to be examined, the display can be cluttered with unrequired, non-common point information.

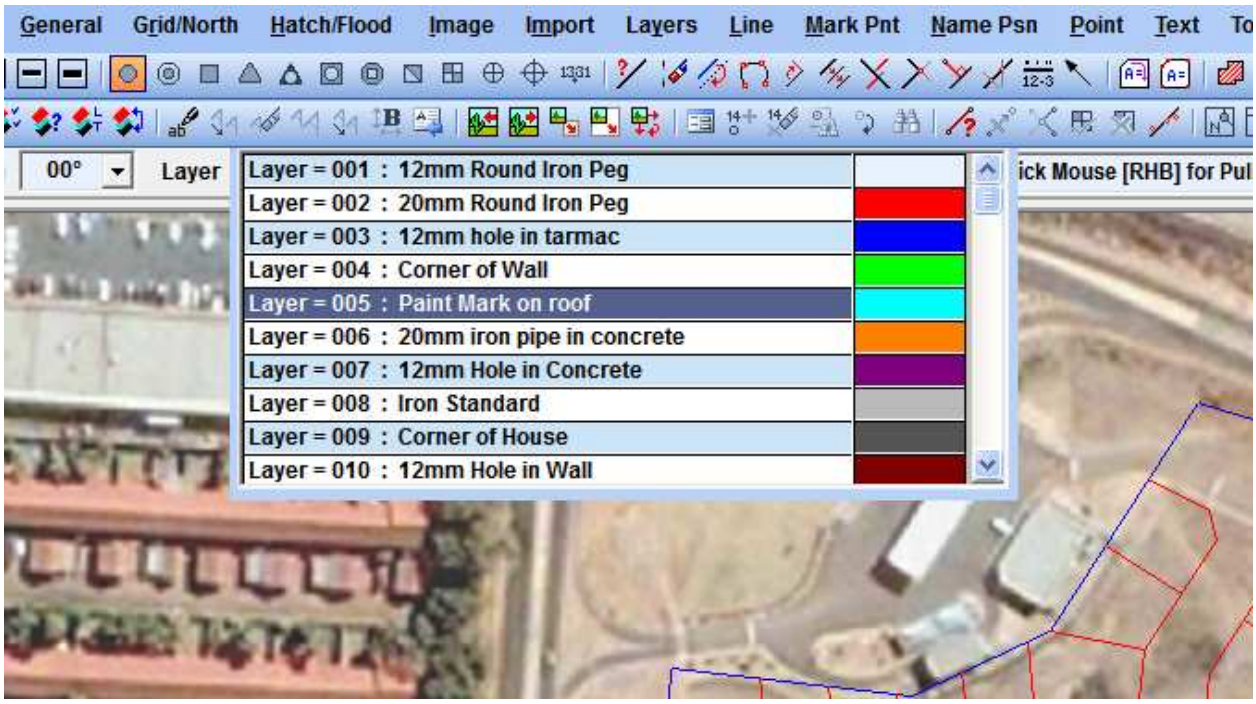
General SURPAC Modifications

- Fix up for the problem occurring when modifying **Engineering Layer/Point Descriptions**.
- (**Engineering** format) Setting **Point Descriptions** to their **Layer/Description Number**, when the Observation file Point Codes are defined as numbers and not text items.
- Fix up for the problem that sometimes occurred when making **Sheet margin** changes for a **Working Plan**.
- Increase of **Sectional Title** units for the **Participation Quota** sheet to a new maximum of **805** units.
- Fix up for problem when importing **General CAD** data into the **GP** or **WP** programmes.
- Fix up of the **Figure Fit -** [**FF**] function, not working from the Menu, in the **General CAD** programme.
- Fix up of the **Figure MidWall** - [**FW**] function problem in the **General CAD** programme.
- Fix up of the **Line Attribute** [**LA**] function problem in the **General Plan**, **Diagram** and **Working Plan** programmes.

Selecting or Changing a Sheet Layer – The method used to **Select** or **Change** a **Layer** has been improved. When clicking on the display box in the Sheet heading area to the right of the heading "**Layer**" (the display box that shows the current **Layer**), a drop down list of the currently defined **Layers** will be shown. The colour of each **Layer** is also shown.

For the **Cadastral** file format, the full **55** available **Layers** will be shown and for the **Engineering** file format only the User Defined **Layers** will be shown.

The **Current Layer** will be highlighted and shown in the middle of the drop down list display. This makes it easier to select a new **Layer** that is close to the **Current Layer**.


General
Grid/North
Hatch/Flood
Image
Import
Layers
Line
Mark Pnt
Name Psn
Point
Text
00°
Layer
Layer = 001 : 12mm Round Iron Peg
Layer = 002 : 20mm Round Iron Peg
Layer = 003 : 12mm hole in tarmac
Layer = 004 : Corner of Wall
Layer = 005 : Paint Mark on roof
Layer = 006 : 20mm iron pipe in concrete
Layer = 007 : 12mm Hole in Concrete
Layer = 008 : Iron Standard
Layer = 009 : Corner of House
Layer = 010 : 12mm Hole in Wall

Layer Selection option in the General CAD – Cadastral file format

A further new feature for the **Layer** display box has been added. Making a right Click (Mouse [RHB]) on this box is the same as pressing the keyboard [**F3**] SFK. This is the **Change Layer and/or Layer Active settings** option. This function allows you to :-

1. Change the current **Layer**,
2. Define which of the other **Layers** are to **Active** for the **Current Layer**,
3. Set whether the **Lines**, Text Items etc. are to be shown in a light grey colour, or hidden altogether,
4. Set whether the **Images** are to be shown in a light grey colour, or hidden altogether.

Cursor Snap Options – Users are now able to set a number of **Snap** options when using the **General CAD** programme, which are :-

- **Snap to Points and/or Lines** – This is the default **Snap** option. After selecting a Sheet position (by clicking the Mouse [LHB]), **SURPAC** will first search for the nearest **Point** within range of the currently set **Snap Radius**. If no **Point** can be found, **SURPAC** will then search for the nearest **Line** terminal within range of the currently set **Snap Radius**. If no Line terminal can be found, **SURPAC** will adopt the current cursor position (i.e. there will be no **Snap** function).

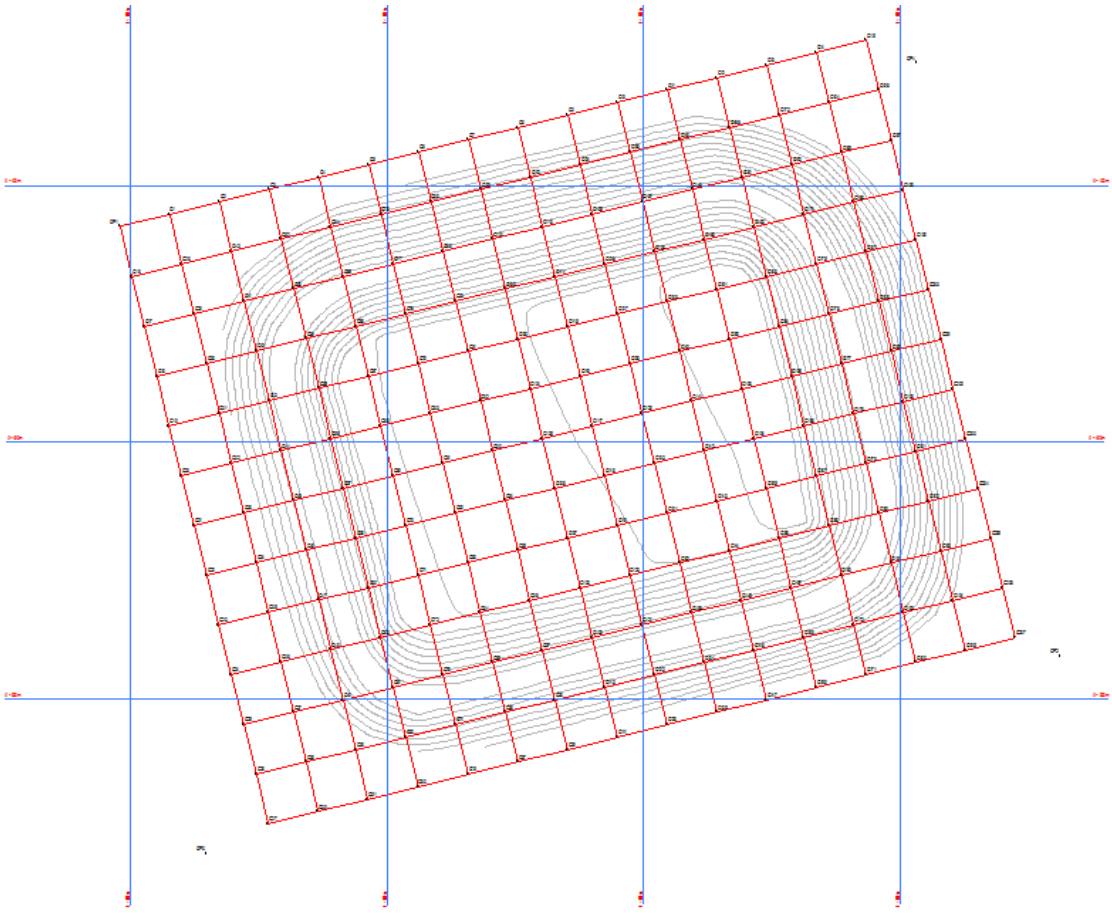
- **Snap to Points Only** – After selecting a Sheet position **SURPAC** will search for the nearest **Point** within range of the currently set **Snap Radius**. If no **Point** can be found, **SURPAC** will adopt the current cursor position (i.e. there will be no **Snap** function).
- **Snap to Lines Only** – After selecting a Sheet position **SURPAC** will search for the nearest **Line** terminal within range of the currently set **Snap Radius**. If no **Line** terminal can be found, **SURPAC** will adopt the current cursor position (i.e. there will be no **Snap** function).

- **Snap to Grid Lines** – After selecting a Sheet position **SURPAC** will search for the nearest **Grid** Line intersection or terminal within range of the currently set **Snap Radius**. If no **Grid** Line intersection or terminal can be found, **SURPAC** will adopt the current cursor position (i.e. there will be no **Snap** function).

There are also options to set the **Snap Radius** (in mm) and to turn the **Snap Mode On/Off**.

To access the **Snap options**, click the **Edit** main menu heading and then select the menu item **Select the Snap Option …..**.

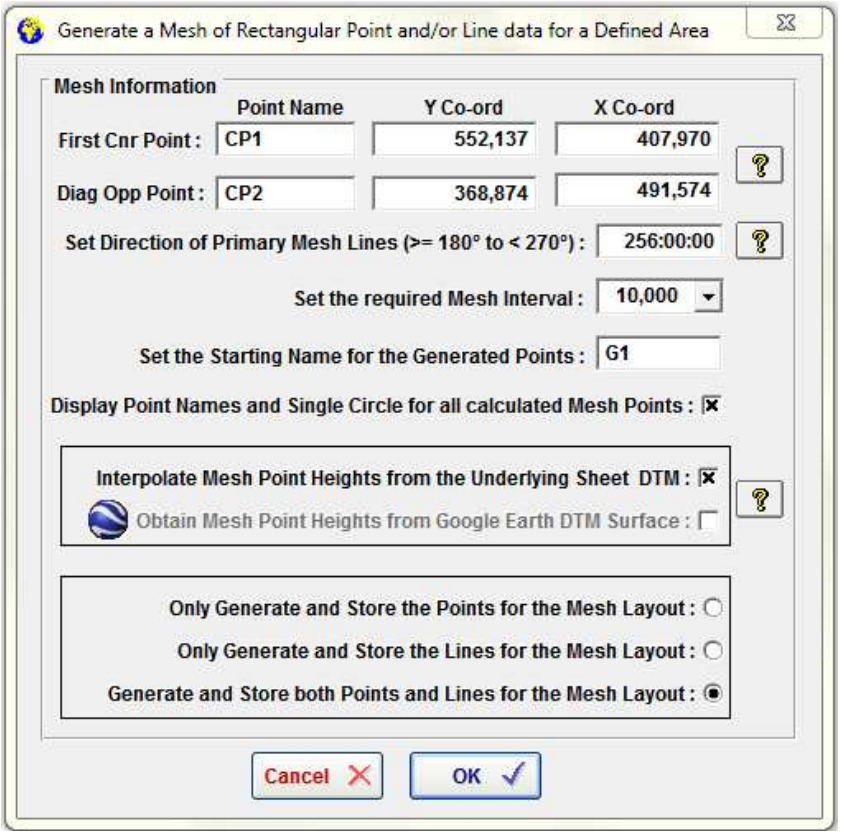
Creating a Rectangular Point and/or Line Mesh – This new function allows for the creation, display and storing of **Lines**, **Points** or both that cover a User defined area. The **Mesh** may be at any User given position, cover any User given rectangular area and be at any User defined **Mesh Interval** or **Orientation**.



Example of a 10m Mesh of Lines and Points created over a slimes dam

To access this function, Click either the **Line** or **Point** main menu heading and then select the menu item **Rectangular Point/Line Mesh** after which the **Mesh** option input form will be displayed.

The **Mesh** position and **Area** to be covered are defined by selecting two **Points** and an **Orientation**. The first **Point** is usually the **Point** on the left (West) side of the area. The second **Point** should be diagonally opposite the first Point.


Generate a Mesh of Rectangular Point and/or Line data for a Defined Area
Mesh Information
Point Name
Y Co-ord
X Co-ord
First Cnr Point :
CP1
552,137
407,970
Diag Opp Point :
CP2
368,874
491,574
Set Direction of Primary Mesh Lines (>= 180° to < 270°) :
256:00:00
Set the required Mesh Interval :
10,000
Set the Starting Name for the Generated Points :
G1
Display Point Names and Single Circle for all calculated Mesh Points :
Interpolate Mesh Point Heights from the Underlying Sheet DTM :
Obtain Mesh Point Heights from Google Earth DTM Surface :
Only Generate and Store the Points for the Mesh Layout :
Only Generate and Store the Lines for the Mesh Layout :
Generate and Store both Points and Lines for the Mesh Layout :
Cancel
OK

Rectangular Mesh Option form

The rectangular **Area** to be covered with a **Mesh** of **Lines** and/or **Points** is User defined. This is done by entering the **First Corner Point**, usually being the Point nearest to the North West corner of the area. The second **Point** entered is the P**oi**nt that is approximately **diagonally opposite** to the first **Point**. These two Points, along with the entered **Mesh Orientation**, will define the rectangle to be covered by the **Mesh**.

The rectangular area does not need to have its boundaries running North-South and/or East-West. When a **Point Name** is entered, **SURPAC** will search for the **Point** in the current **Co-ordinate file**. If no **Point** can be found, the co-ordinate values must be entered manually. It is advisable to select and add (using the **Point Add** [**PA**] Command) the two Points on the Sheet, before running this function.

The second **Point** chosen should be approximately diagonally opposite the first **Point**. Hence, for a Mesh oriented NS and EW, the second **Point** needs to be approximately SE of the first **Point**. However, for a **Mesh** oriented at about 225° (for **UTM** 45°), i.e. The **Mesh** lines running NW to SE and SW to NE), the second Point needs to be approximately due East of the first **Point**.

Enter the required **Mesh Orientation** and **Mesh Interval**. The **Orientation** of the **Mesh** is set by providing the required **Direction** of the primary **Mesh** axis. This value should be greater or equal to 180° and less than 270° (for **UTM** Systems, use be greater or equal to 0° and less th an 90°). However, **SURPAC** will automatically adjust entered values that are outside these limits. The direction of the secondary **Mesh** axis will automatically be set perpendicular to the primary **Mesh** axis.

If **Points** are to be generated for the **Mesh** intersection positions, then set the **Description Code** and the **Display** Options for these **Points**.

Highting of the Mesh Intersection Points

Option #1 - Highting Points from a SURPAC DTM :-

If the current **General CAD** Sheet has a defined and underlying **DTM**, then the first of the Height Options may be used to determine heights for the generated **Mesh Points**. Using this method, the programme will interpolate heights for each of the **Mesh Points** by from the **DTM**.

***NB** : To define a **DTM** for a **General CAD** Sheet, Click on the "**File**" Menu heading and select "**CAD Sheet Setup Information**"*

Option #2 – Highting Points from the Google Earth Surface DTM :-

If the current **Co-ordinate File** System is defined as using the **WGS 1984** Ellipsoid, then the **Mesh Point Heights** may be interpolated from the **Google Earth Surface DTM**, via **SURPAC's** activation of the **Google Elevation API**.

The smaller the Mesh Interval, the more Points will be added to the file and the more accurate will be the resulting Contours and DTMs. However, Users must bear in mind that the **Google Earth** Heights have a relative accuracy of about +-3 metres and the resulting Contours and DTMs are only to these accuracies.

Further to this, the **Google Earth DTM** may also have a significant vertical shift compared to surveyed ground heights. It may be necessary, therefore, to adjust the interpolated heights based on a comparison with control Points, such as Trig. Beacons, close to the area."

***NB** : The use of the **Google Elevation API** is subject to a limit of 2,500 requests per day. Each **SURPAC** request consists of 4 locations Points, providing a maximum daily (i.e. for a 24 hour period) download of 10,000 Points.*

General SURPAC Modifications

- **General CAD programme** – The **View/Select Linked files** function was not working. This has now been fixed..
- **General CAD programme** – When importing Layers from a **DXF** or **DWG** file, the **De-Selected Layers** were still being imported. This has now been corrected.
- **General CAD programme** – When importing data from a **DXF** or **DWG** file, there was a problem importing certain **PolyLines**. This has now been corrected.
- **Sectional Title programme** - A problem sometimes occurred for jobs with a large number of units, causing the display of the **Areas** on the final sheet to overflow the defined margins. This has now been corrected.
- **General Plan programme** – The function to switch the sheet display from **Monochrome** to **Colour** was not working. This has now been corrected.
- **Transforming between Cape/Arc950 and WGS 1984 programme** – In certain areas and under certain conditions, the programme was reporting that there were insufficient common points to carry out a transformation. This was in fact due to a “bug” which has now been corrected.
- **New Co-ordinate systems** – The **Arc 1960 Geodetic Systems** (**Zones 36 and 37**) for **Kenya** and **Tanzania** have been added to **SURPAC**. Users working in these areas can now set their surveys in either of these systems. These systems are based on the **Clarke 1880** (**Modified**) spheroid and use the **UTM** (**SE**) co-ordinate system.

Importing and Exporting ESRI Shapefiles in SURPAC

SURPAC is now able to import and export **Point**, **Line**, **Polygon** and **Text** information, using the **ESRI Shapefile** format. This is an important addition, as it enables Surveyors using **SURPAC** to exchange information with individuals and companies using **GIS** (Geographic Information System) applications, such as **ArcView**, **ARC/INFO**, **ArcGIS**, **OpenStreetMap**, **PlanetGIS TGIS**, **1Map** and many others.

Shapefiles explained in brief

The **ESRI Shapefile**, or simply **Shapefile**, is a geospatial vector data format for **GIS** software. **Shapefiles** can spatially describe features such as **Points**, **Lines**, **Polygons** and **Text**. The **Shapefile** format was first introduced with **ArcView GIS** in the early 1990s

Shapefiles store the basic geometric data types mentioned above. As these elements generally require some form of attribute to specify what they represent, a table of records (i.e. a data base) can be used to store attributes for any element in the **Shapefile**.

A **Shapefile** is not a single “file”, but actually a set of several component files. Three individual files are mandatory to store the core data that comprise a **Shapefile**, being the ***.shp**, ***.shx**, and ***.dbf** files (which are explained below).

The fourth file type, considered as being optional in some applications, but which is important to Surveyors and which is always created in **SURPAC**, is the ***.prj** file. All files related to a **Shapefile** must be located in the same folder.

Shapefile component file descriptions

1. ***.shp** — the **shape format** file, which contains the feature geometry itself, using either System (**Lo**, **WG**, **UTM** etc.) co-ordinates, or geographic (**Latitude**, **Longitude**) co-ordinates.
2. ***.shx** — the **shape index** format file, consisting of positional indices of the feature geometry to allow rapid forwards and backwards data searching.
3. ***.dbf** — the **attribute format** data base file, consisting of the shape attributes for each shape, line or text item, using the **dBase IV** format (which can also be viewed using **Microsoft Excel**).
4. ***.prj** — the **data projection format**, consisting of a description of the co-ordinate System and ellipsoid Projection information. This file is in plain **ASCII** format. Although optional, it is usually provided, making it unnecessary for Users to have to guess the co-ordinate system of features in a **Shapefile**. **SURPAC** always provides a ***.prj** file when creating a **Shapefile**.

   The information contained in the ***.prj** file should specify the :-

   Name of the Geographic co-ordinate system or Map projection
   Datum (geodesy)
   Spheroid
   Prime meridian
   Units used
   Parameters necessary to define the map projection, for example:
   Latitude of origin
   Scale factor
   Central meridian
   False northing
   False easting
   Standard parallels

Creating Shapefiles in SURPAC

Three **SURPAC** programmes can be used to create (write) a **Shapefile**, namely the **Co-ordinate File Editing** programme (for **Points**), the **General CAD** programme (for **Lines** and **Text**) and the **General Plan** programme (for **Polygons**, **Lines** and **Text**).

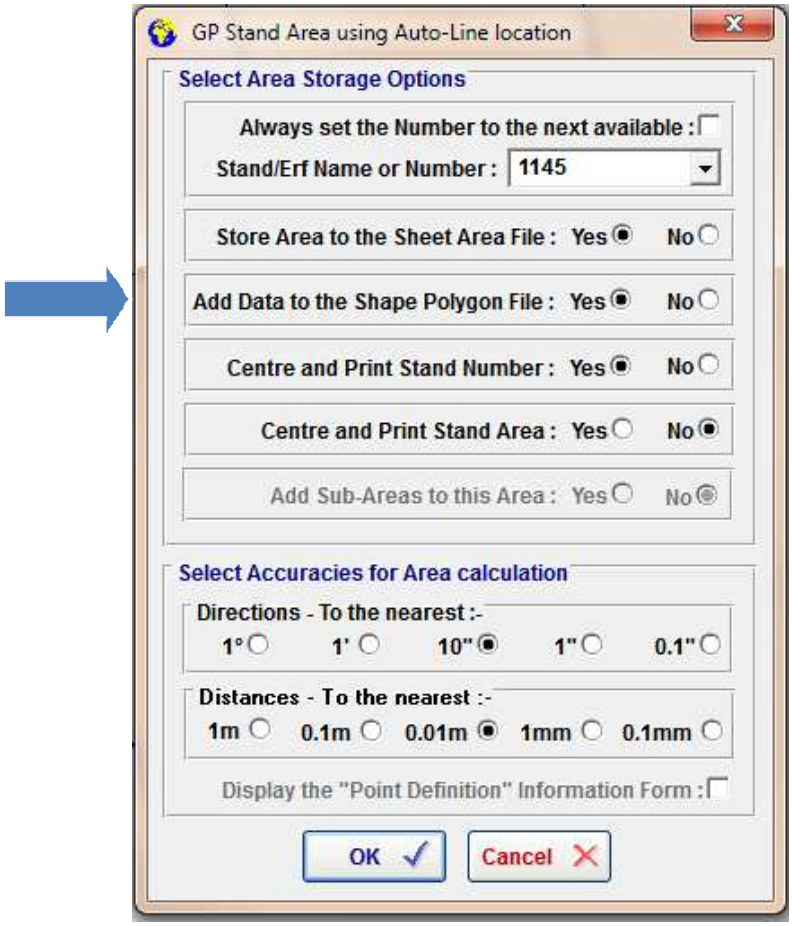
Shapefiles created in **SURPAC** may consist of :-

1. **Polygons** (only when using the **General Plan** programme)
2. **Lines**
3. **Text** items
4. Any combination of the above, or
5. **Points**.

Polygons in a SURPAC created Shapefile

Only the **General Plan** programme is capable of generating **Polygons** to be included in a **Shapefile**. When using one of the **Area** commands ([**A**], [**Ctrl**]+[**A**] or [**F11**] Commands) in the **General Plan** programme, the form shown below is displayed. A new option has been added to this form, namely the option "**Add Data to the Shape Polygon File**".

The **SURPAC Shape Polygon file** is a file that stores the co-ordinates of the corner Points of the Stands, or polygons, along with each Stand's Name/Number and Area. Ultimately, this information is used to generate the **Polygons** that are written to a **Shapefile**, when required.


GP Stand Area using Auto-Line location
Select Area Storage Options
Always set the Number to the next available :
Stand/Erf Name or Number : 1145
Store Area to the Sheet Area File : Yes No
Add Data to the Shape Polygon File : Yes No
Centre and Print Stand Number : Yes No
Centre and Print Stand Area : Yes No
Add Sub-Areas to this Area : Yes No
Select Accuracies for Area calculation
Directions - To the nearest :-
1° 1' 10" 1" 0.1"
Distances - To the nearest :-
1m 0.1m 0.01m 1mm 0.1mm
Display the "Point Definition" Information Form :
OK
Cancel

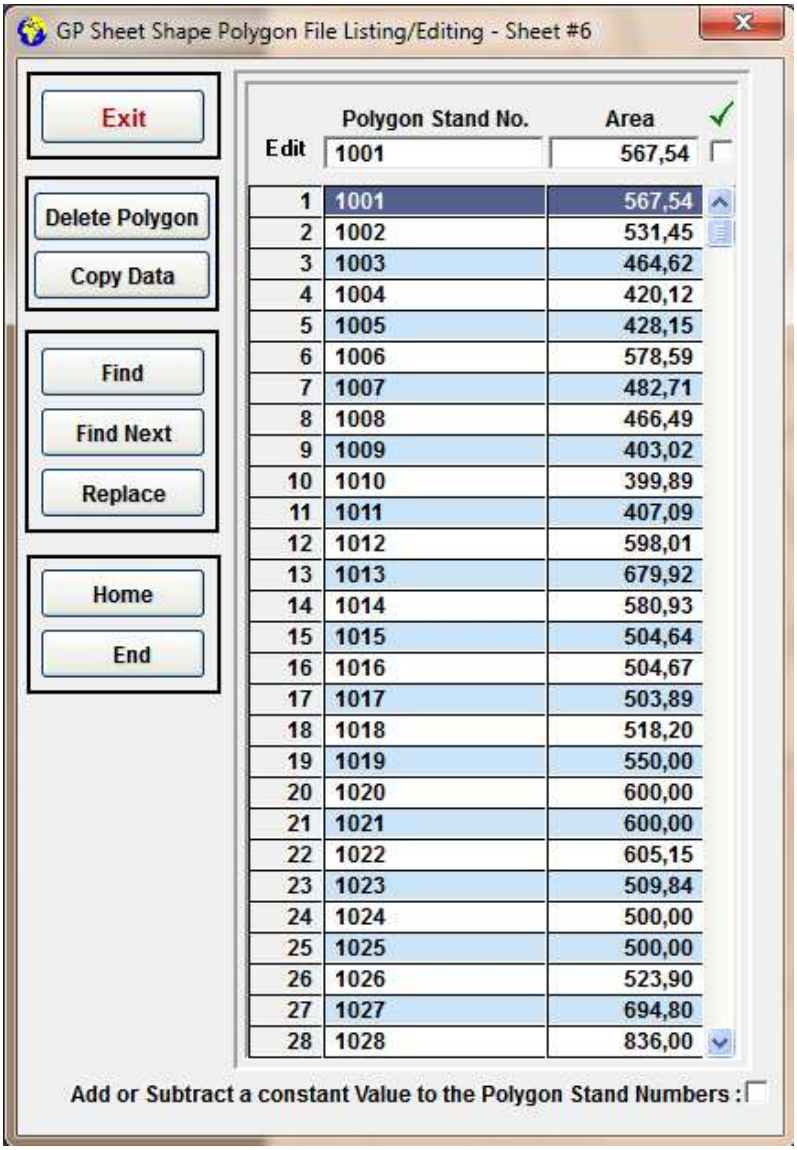
GP Stand Area form showing Shape Polygon File option

Each General Plan Sheet has its own **Shape Polygon** file. The information held in a Sheet's **Shape Polygon** file may be listed and/or edited using the facility provided under the **General Plan's Edit** menu heading. Click on the **Edit** menu heading and then select the item **Edit the**

Sheet Shape Polygon File Data. **Polygons** maybe deleted from the file, or their Name/Number and/or Area may be edited. The Point co-ordinates used to define the **Polygon** cannot be edited.

When exporting **Polygons** to a **Shapefile**, **SURPAC** adds the following attributes to each **Polygon** by means of the associated ***.dbf** file (**attribute format** data base file) :-

STAND_NAME The Stand Name of the **Polygon** (Stand/Erf)
STAND_AREA The Area, in square metres, or Hectares, of the **Polygon** (Stand/Erf)



Sample of a GP Sheet Polygon File Editing

Lines in a SURPAC created Shapefile

Lines may be exported to a **Shapefile** from either the **General CAD** programme or the **General Plan** programme. By default, **Shapefiles** do not store **Line** Attributes and each **Line** is regarded as a solid, single width, colourless item.

To overcome these attribute limitations, the **SURPAC** programmes attach attributes to each **Line** by means of the associated ***.dbf** file (**attribute format** data base file). **SURPAC** creates the following headings in this file, with the appropriate attribute value being added to each heading for each **Line** :-

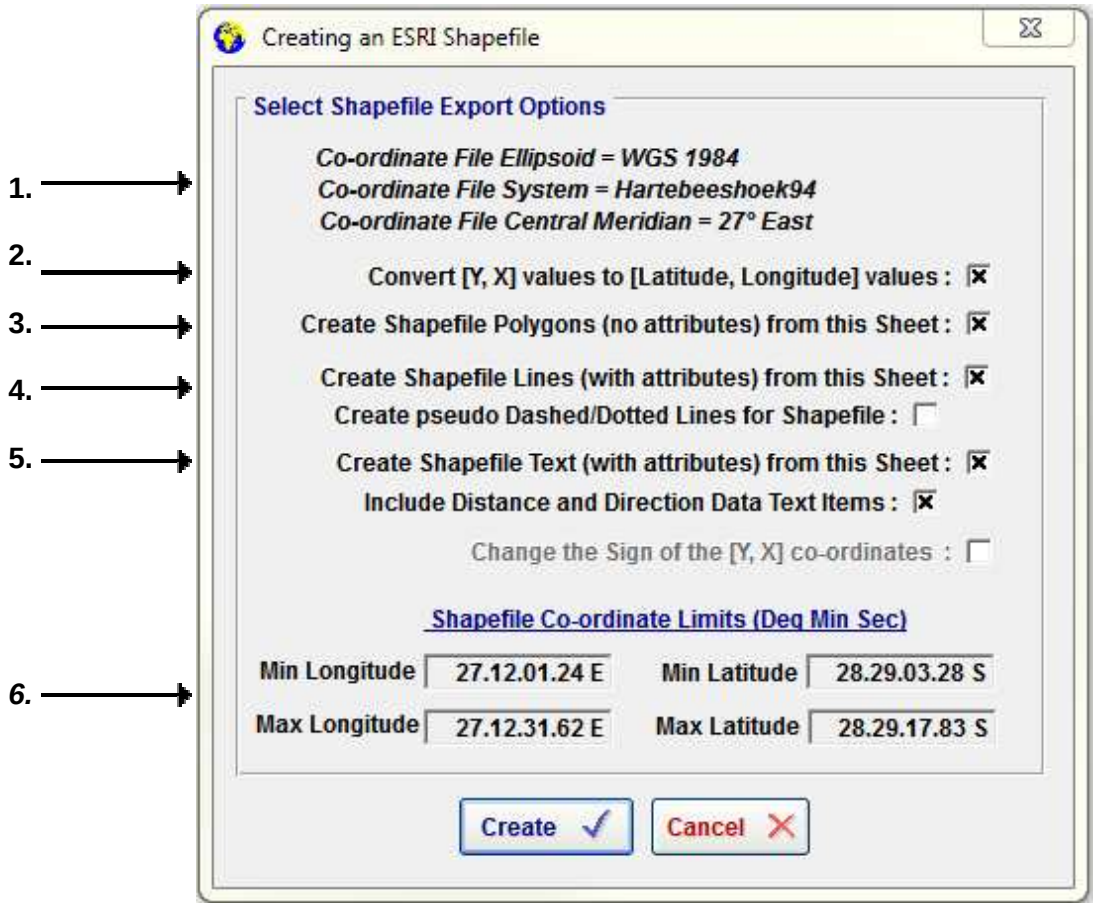
LINE_STYLE The Style of the **Line** (refer to **SURPAC Line** Styles)
LINE_WIDTH The **Line** Width (refer to the **SURPAC Line** Width settings)
LINE_LAYER The Layer Number (or Pen Number) for the **Line**.

Text Items in a SURPAC created Shapefile

Text Items may be exported to a **Shapefile** from either the **General CAD** programme or the **General Plan** programme. By default, **Shapefiles** do not store **Text** Attributes and each **Text** item is considered as having uniform size, style, width-to-height ratio, orientation, font and Layer.

To overcome these attribute limitations, the **SURPAC** programmes attach attributes to each **Text** item by means of the associated ***.dbf** file (**attribute format** data base file). **SURPAC** creates the following headings in this file, with the appropriate attribute value being added to each heading for each **Text** item :-

TEXT_ITEM	The **Text** item itself, with a maximum length of 80 characters.
TEXT_DIRN	The Direction, or Orientation of the **Text** item, in Degrees.
TEXT_SIZE	The Size of the **Text** item, in mms.
TEXT_WTH	The Width to Height ratio for the **Text** item.
TEXT_STYLE	The Style of the **Text** item – Normal, *Italic*, ***Bold*** or ***Bold Italic***.
TEXT_FONT	The Font for the **Text** Item.
TEXT_LAYER	The Layer Number (or Pen Number) for the **Text** Item.
TEXT-SCALE	The Scale of the source Sheet, used for scaling the **Text** item on the new Sheet.


1.
2.
3.
4.
5.
6.
Creating an ESRI Shapefile
Select Shapefile Export Options
Co-ordinate File Ellipsoid = WGS 1984
Co-ordinate File System = Hartebeeshoek94
Co-ordinate File Central Meridian = 27° East
Convert [Y, X] values to [Latitude, Longitude] values :
Create Shapefile Polygons (no attributes) from this Sheet :
Create Shapefile Lines (with attributes) from this Sheet :
Create pseudo Dashed/Dotted Lines for Shapefile :
Create Shapefile Text (with attributes) from this Sheet :
Include Distance and Direction Data Text Items :
Change the Sign of the [Y, X] co-ordinates :
Shapefile Co-ordinate Limits (Deg Min Sec)
Min Longitude 27.12.01.24 E
Min Latitude 28.29.03.28 S
Max Longitude 27.12.31.62 E
Max Latitude 28.29.17.83 S
Create
Cancel

SURPAC CAD Option form for Creating a Shapefile (See explanations below)

The above form shows the available options that may be selected when creating a **Shapefile**.

1. The **Shapefile** Creation form will automatically display the **Ellipsoid**, Co-ordinate **system** and **Central Meridian** (or Zone) set for the current **Co-ordinate File**. (These values can only be changed by editing the **Co-ordinate File** system via the **Co-ordinate File Editing** programme).
2. This option allows you to either create the **Shapefile** co-ordinates in the **System** of the current **Co-ordinate File** (**Y**, **X** or **E**, **N**), or in **Latitude** and **Longitude**. Creating the **Shapefile** using **Latitude**, **Longitude** values is preferable, as this provides more flexibility for the end user, when importing the **Shapefile**.

3. **Shapefile Polygons** : (Only available in the **General Plan** programme). If the **General Plan** Sheet has an existing **Shape Polygon File** (see Pg. 3), then the option to create **Polygons** in the **Shapefile** will be active. Select this item to create **Polygons**. Normally, either **Polygons** or **Lines** are created in a **Shapefile**. Creating both will cause a duplication of many of the Sheet **Lines**.

4. **Shapefile Lines** : This option allows you to export all **Lines** on the current Sheet to the **Shapefile**. When **SURPAC** exports a **Line** to the **Shapefile**, it automatically populates the associated ***.dbf** file with the above mentioned attribute values (see Pg. 4).

   In order for a **GIS**, or any other application to display the imported **Lines** with their correct attributes, it needs to be able to read and apply these attribute values correctly. **SURPAC** obviously is able to do this, so that **Shapefiles** created in a **SURPAC** application can be imported by another **SURPAC** application, with the **Lines** shown with their correct attributes. Using a **Shapefile** is, in fact, a quite convenient and compact method for a User to transfer sheet information between programmes, or from one User to another.

   If the **Lines** are to be sent to a **Shapefile**, then there is a further option that allows **SURPAC** to send the **Lines** using a "**pseudo Dashed/Dotted**" technique. This is useful for importing **Lines** into applications that are not able to make use of the above mentioned **SURPAC Line** attributes stored in the **Shapefile**. Selecting his option will cause **SURPAC** to create **Line** dash and/or dot segments between the **Line** terminals, equivalent to the **Line's Style**. This will produce an imported **Line** display that approximates the original Sheet **Line** data in Style, but not in Width nor in Layer.

5. **Shapefile Text** : This option allows you to export **Text** items on the current Sheet to the **Shapefile**. When **SURPAC** exports a **Text** item to the **Shapefile**, it automatically populates the associated ***.dbf** file with the above mentioned attribute values (see Pg. 5).

   In order for a **GIS**, or any other application to display the imported **Text** items with their correct attributes, it needs to be able to read and apply these attribute values correctly. **SURPAC** obviously is able to do this, so that **Shapefiles** created in a **SURPAC** application can be imported by another **SURPAC** application, with the **Text** items shown with their correct attributes. Using a **Shapefile** is, in fact, a quite convenient and compact method for a User to transfer sheet information between programmes, or from one User to another.

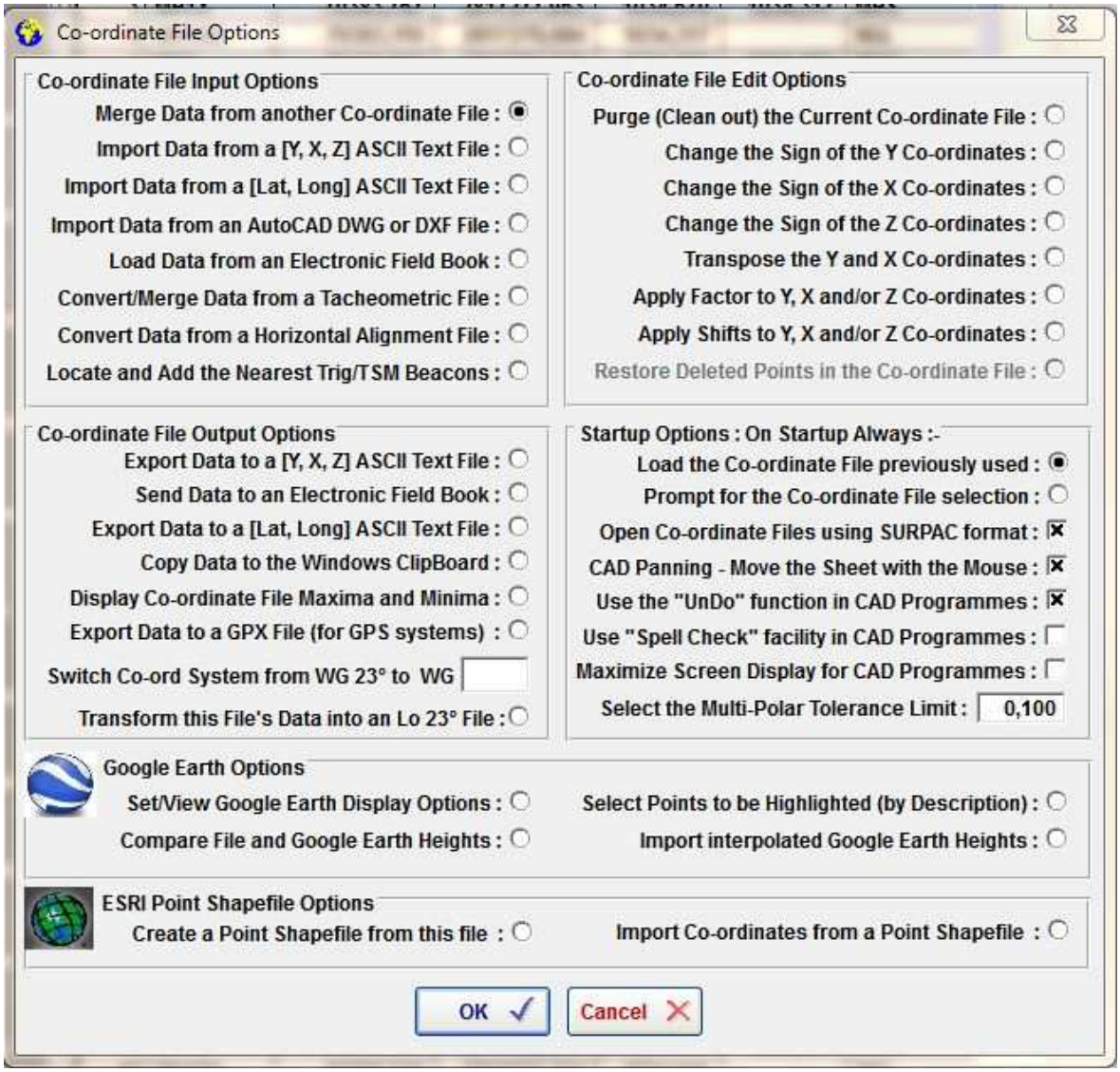
   If the **Text** items are to be sent to a **Shapefile**, then there is a further option that allows **SURPAC** to send all the **Text** items on a Sheet, such as the Directions and Distances making up the Stand data, to the **Shapefile**. If this option is not selected, then only the major **Text** items, such as Stand Numbers, Street Names, Sheet Headings etc. will be sent to the Shapefile.

6. These information blocks display the maximum and minimum co-ordinate values for the data that is to be exported to the **Shapefile**. The values are shown in either System co-ordinates (**Y**, **X** or **E**, **N**), or in **Latitude**, **Longitude**. Exporting data in Latitude, Longitude format is preferable and more flexible.

   The sign of the (**Y**, **X** or **E**, **N**) co-ordinate values can be swapped, if necessary, to cater for those Northern hemisphere applications that require that 0° be set to North and not South, as for the Southern African **Lo** and **WG** Systems.

Point Data in a SURPAC created Shapefile

Point data may be exported to a **Shapefile** via the **[File Options]** menu item ***Actions*** bar menu, when in the **Co-ordinate File Editing** programme.

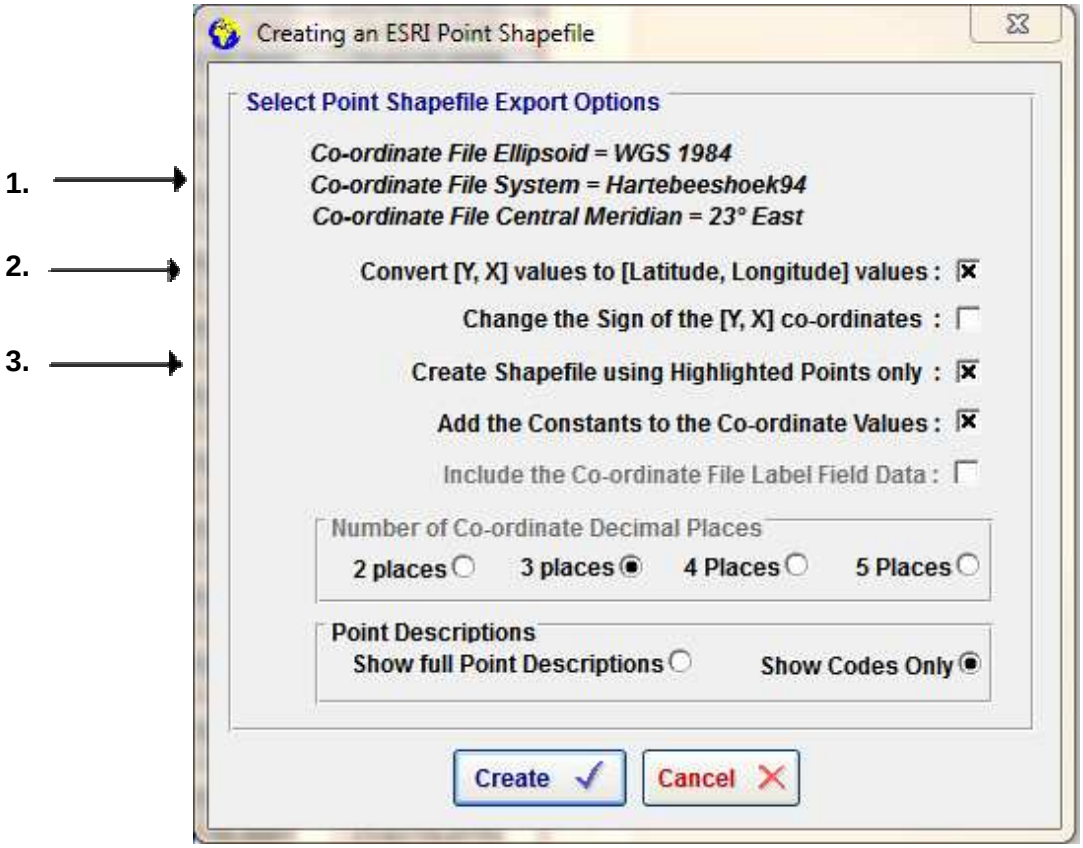

Co-ordinate File Options
Co-ordinate File Input Options
Merge Data from another Co-ordinate File :
Import Data from a [Y, X, Z] ASCII Text File :
Import Data from a [Lat, Long] ASCII Text File :
Import Data from an AutoCAD DWG or DXF File :
Load Data from an Electronic Field Book :
Convert/Merge Data from a Tacheometric File :
Convert Data from a Horizontal Alignment File :
Locate and Add the Nearest Trig/TSM Beacons :
Co-ordinate File Edit Options
Purge (Clean out) the Current Co-ordinate File :
Change the Sign of the Y Co-ordinates :
Change the Sign of the X Co-ordinates :
Change the Sign of the Z Co-ordinates :
Transpose the Y and X Co-ordinates :
Apply Factor to Y, X and/or Z Co-ordinates :
Apply Shifts to Y, X and/or Z Co-ordinates :
Restore Deleted Points in the Co-ordinate File :
Co-ordinate File Output Options
Export Data to a [Y, X, Z] ASCII Text File :
Send Data to an Electronic Field Book :
Export Data to a [Lat, Long] ASCII Text File :
Copy Data to the Windows ClipBoard :
Display Co-ordinate File Maxima and Minima :
Export Data to a GPX File (for GPS systems) :
Switch Co-ord System from WG 23° to WG
Transform this File's Data into an Lo 23° File :
Startup Options : On Startup Always :-
Load the Co-ordinate File previously used :
Prompt for the Co-ordinate File selection :
Open Co-ordinate Files using SURPAC format :
CAD Panning - Move the Sheet with the Mouse :
Use the "UnDo" function in CAD Programmes :
Use "Spell Check" facility in CAD Programmes :
Maximize Screen Display for CAD Programmes :
Select the Multi-Polar Tolerance Limit :
0,100
Google Earth Options
Set/View Google Earth Display Options :
Compare File and Google Earth Heights :
Select Points to be Highlighted (by Description) :
Import interpolated Google Earth Heights :
ESRI Point Shapefile Options
Create a Point Shapefile from this file :
Import Co-ordinates from a Point Shapefile :
OK
Cancel

The [File Options] form, showing the ESRI Point Shapefile options

In the **Co-ordinate File Editing** programme, click on the **[File Options]** menu item found in the ***Actions*** bar at the left of the co-ordinate display.

The two new **Point Shapefile** options are shown at the bottom of the above form. Double click on the **Create a Point Shapefile from this file** option.

The programme will prompt for the name of the new **Shapefile** and then display the following set up form.


1.
2.
3.
Creating an ESRI Point Shapefile
Select Point Shapefile Export Options
Co-ordinate File Ellipsoid = WGS 1984
Co-ordinate File System = Hartebeeshoek94
Co-ordinate File Central Meridian = 23° East
Convert [Y, X] values to [Latitude, Longitude] values :
Change the Sign of the [Y, X] co-ordinates :
Create Shapefile using Highlighted Points only :
Add the Constants to the Co-ordinate Values :
Include the Co-ordinate File Label Field Data :
Number of Co-ordinate Decimal Places
2 places
3 places
4 Places
5 Places
Point Descriptions
Show full Point Descriptions
Show Codes Only
Create
Cancel

Option Form for Creating a Point Shapefile

The above form shows the available options that may be selected when creating a **Shapefile**.

- The **Shapefile** Creation form will automatically display the **Ellipsoid**, Co-ordinate **system** and **Central Meridian** (or Zone) set for the current **Co-ordinate File**.
- This option allows you to either create the **Shapefile** co-ordinates in the **System** of the current **Co-ordinate File** (**Y**, **X** or **E**, **N**), or in **Latitude** and **Longitude**. Creating the **Shapefile** using **Latitude**, **Longitude** values is preferable, as this provides more flexibility for the end user, when importing the **Shapefile**.
- If you only want to include certain **Points** for the **Shapefile**, then mark (**Highlight**) these **Points** in the Co-ordinate file listing before creating the **Shapefile**, otherwise the whole Co-ordinate file will be used.

Once the required options have been selected, **SURPAC** will create a **Point Shapefile** from the current **Co-ordinate** file. The **Shapefile** itself only consists of the **Y**, **X**, B (or **E**, **N**, **H**) values for each **Point**. To overcome these attribute limitations, **SURPAC** attaches attributes to each **Point** by means of the associated ***.dbf** file (**attribute format** data base file). **SURPAC** creates the following headings in this file, with each attribute being added to each heading for each **Point** :-

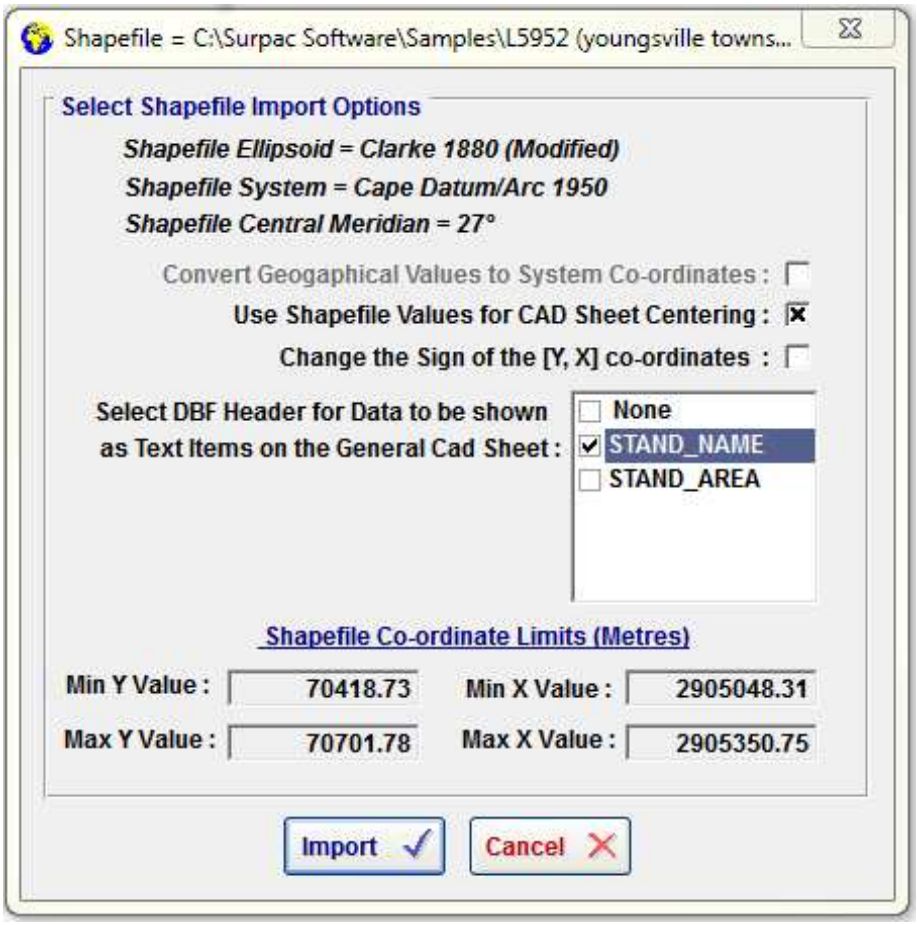
POINT_NAME The **Point Name**, up to 8 characters.
POINT_CODE The **SURPAC** Description **Code** for the **Point**, **OR**
POINT_DESC The **SURPAC** Full Description for the **Point**.
CALC_PAGE The **Calculation** Page number for the **Point**.
FB_PAGE The **Field Book** Page number for the **Point**.
DATE The **Date** the Point was last calculated or modified.
LABEL _1 The **Point Label #1** Heading.
LABEL _2 The **Point Label #2** Heading.

Importing Polygons from a Shapefile into SURPAC

Polygons can be imported into either the **General CAD** programme or the **Cadastral General Plan CAD** programme.

If you are importing a **Shapefile** that has been created through **SURPAC** or any other application that quantifies **Line** and **Text** attributes (such as Layer, Pen width, Style etc.), then the current Layer (or Pen number) set in the **CAD** Sheet is not important, as imported data will be correctly allocated. However, if the **Shapefile**'s associated ***.dbf** file does not include attributes, set the **CAD** Sheet into the required **Layer**, with the required **Line** and **Text** Style, before importing the **Shapefile** polygons.

Click on the **Import** menu heading and then select the **Import Data from an ESRI Shapefile** menu item and then select the required **Shapefile** to be imported.


Shapefile = C:\Surpac Software\Samples\L5952 (youngsville towns...
Select Shapefile Import Options
Shapefile Ellipsoid = Clarke 1880 (Modified)
Shapefile System = Cape Datum/Arc 1950
Shapefile Central Meridian = 27°
Convert Geogaphical Values to System Co-ordinates :
Use Shapefile Values for CAD Sheet Centering :
Change the Sign of the [Y, X] co-ordinates :
Select DBF Header for Data to be shown as Text Items on the General Cad Sheet :
None
STAND_NAME
STAND_AREA
Shapefile Co-ordinate Limits (Metres)
Min Y Value : 70418.73
Min X Value : 2905048.31
Max Y Value : 70701.78
Max X Value : 2905350.75
Import
Cancel

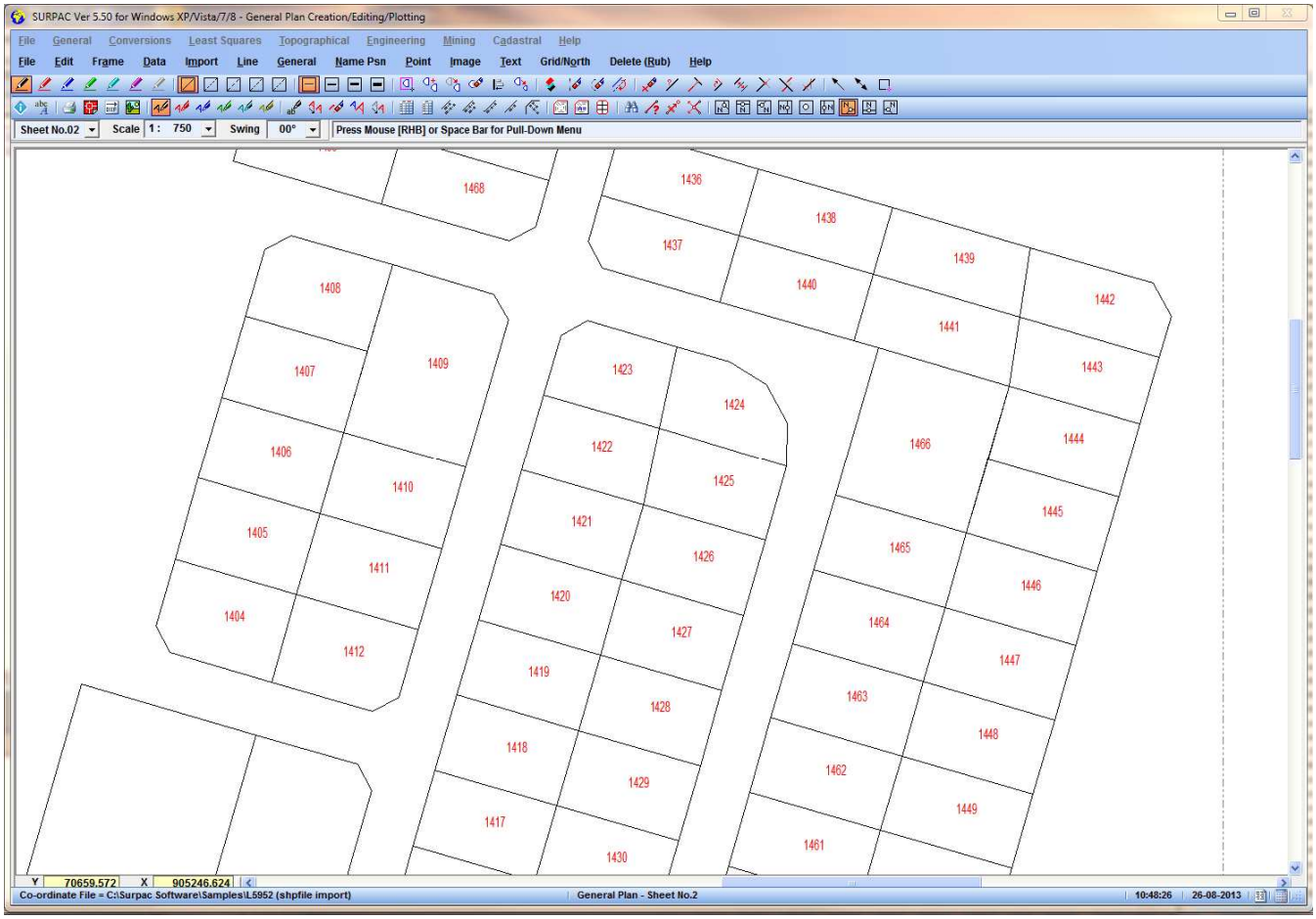
Importing an ESRI Shapefile Polygons into SURPAC

In the above example, the Shapefile co-ordinates are System [Y, X] values. The system used is displayed at the top of the screen and, therefore, the option to convert from Geographical [Lat, Long] values to system [Y, X] values is not active.

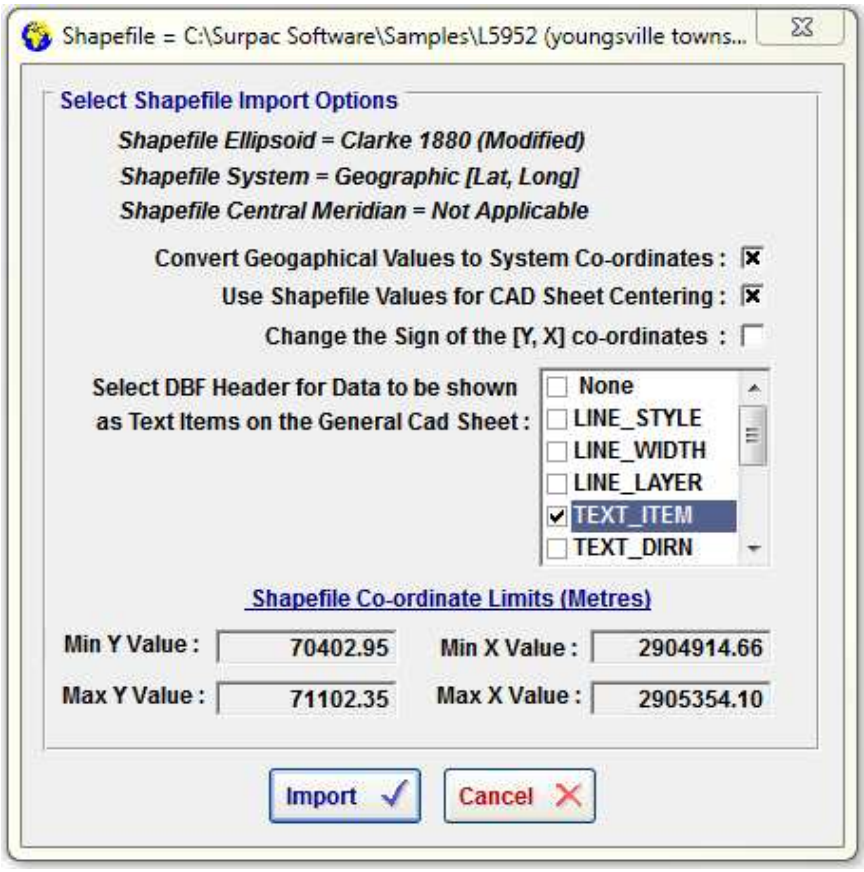
NB : *Ensure that Max/Min co-ordinate values shown at the bottom of the form are in the range of the limits of the current CAD Sheet being used to import the data.*

The List box at the right of the form shows the Shapefile associated ***.dbf** Headings. In this case, only the **STAND_NAME** and **STAND_AREA** are options for importing and displaying a text header for each **Shapefile** polygon. If you select **STAND_NAME**, for example, **SURPAC** will convert the headings into **Text** Items and then place each heading at the centre of their respective polygons.

In the example shown below, the **Shapefile** polygons were imported into Layer 1 (Black). The imported headings were then transferred into Layer 2 (Red).



Shapefile Polygons Imported into SURPAC


Shapefile = C:\Surpac Software\Samples\L5952 (youngsville towns...
Select Shapefile Import Options
Shapefile Ellipsoid = Clarke 1880 (Modified)
Shapefile System = Geographic [Lat, Long]
Shapefile Central Meridian = Not Applicable
Convert Geogaphical Values to System Co-ordinates :
Use Shapefile Values for CAD Sheet Centering :
Change the Sign of the [Y, X] co-ordinates :
Select DBF Header for Data to be shown as Text Items on the General Cad Sheet :
None
LINE_STYLE
LINE_WIDTH
LINE_LAYER
TEXT_ITEM
TEXT_DIRN
Shapefile Co-ordinate Limits (Metres)
Min Y Value : 70402.95
Min X Value : 2904914.66
Max Y Value : 71102.35
Max X Value : 2905354.10
Import
Cancel

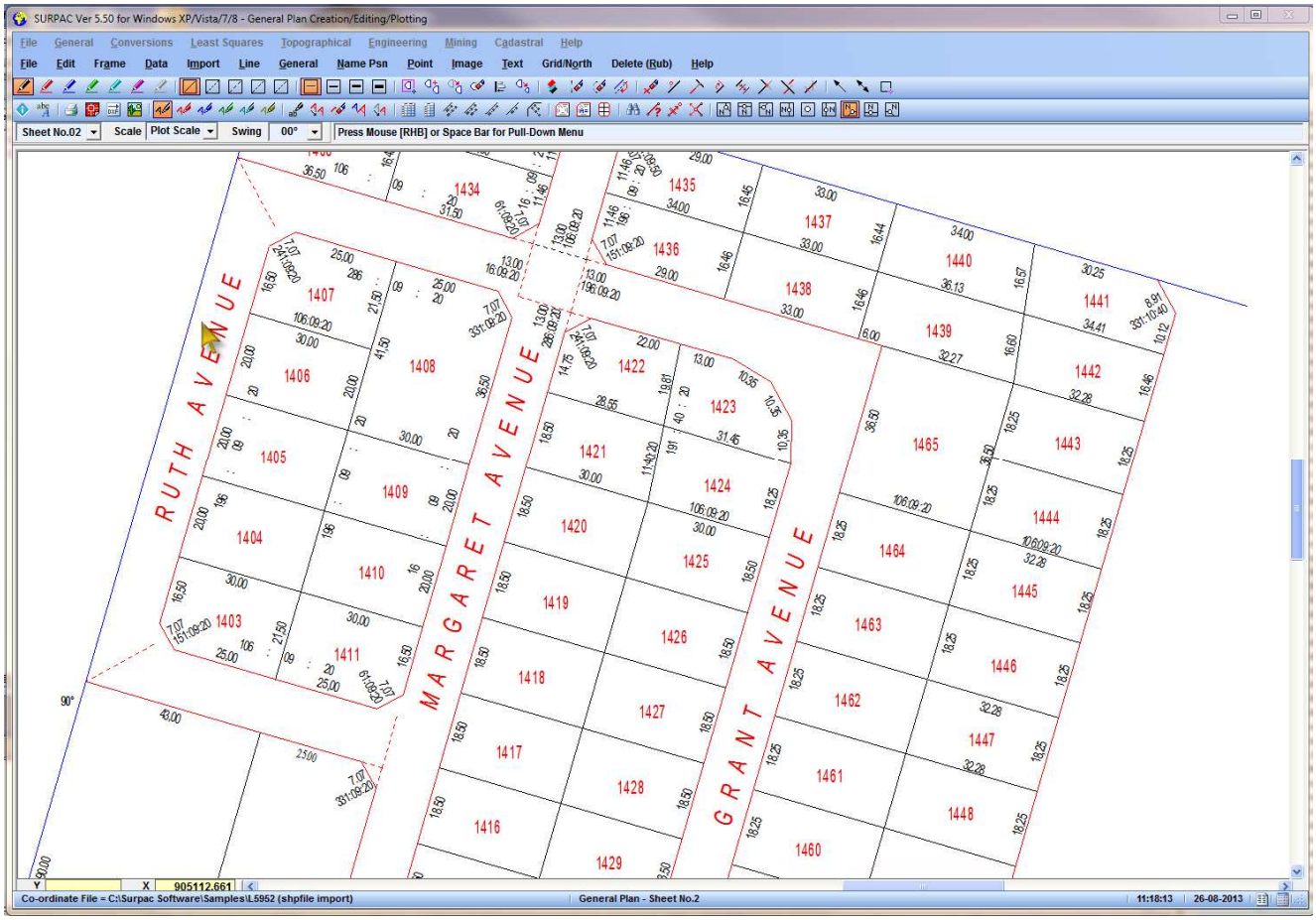
Importing Lines and Text from a SURPAC created Shapefile

Importing Lines and Text from a SURPAC format Shapefile into a SURPAC CAD Sheet

If the **Shapefile's ***.prj** file (the data projection format) is missing, or it is incorrectly created, the above form will show the **Ellipsoid**, **System** and **Central Meridian** as being **undefined**. In this case you might need to ascertain more information regarding these values from the company, or person, who issued the **Shapefile**.

When importing **Lines** and **Text** from a **SURPAC** created **Shapefile**, or a **Shapefile** created by an application using the same data protocols as **SURPAC** (see Pages **4** and **5**), all **Line** and **Text** attributes will be read from the associated ***.dbf** file and applied to the incoming data.

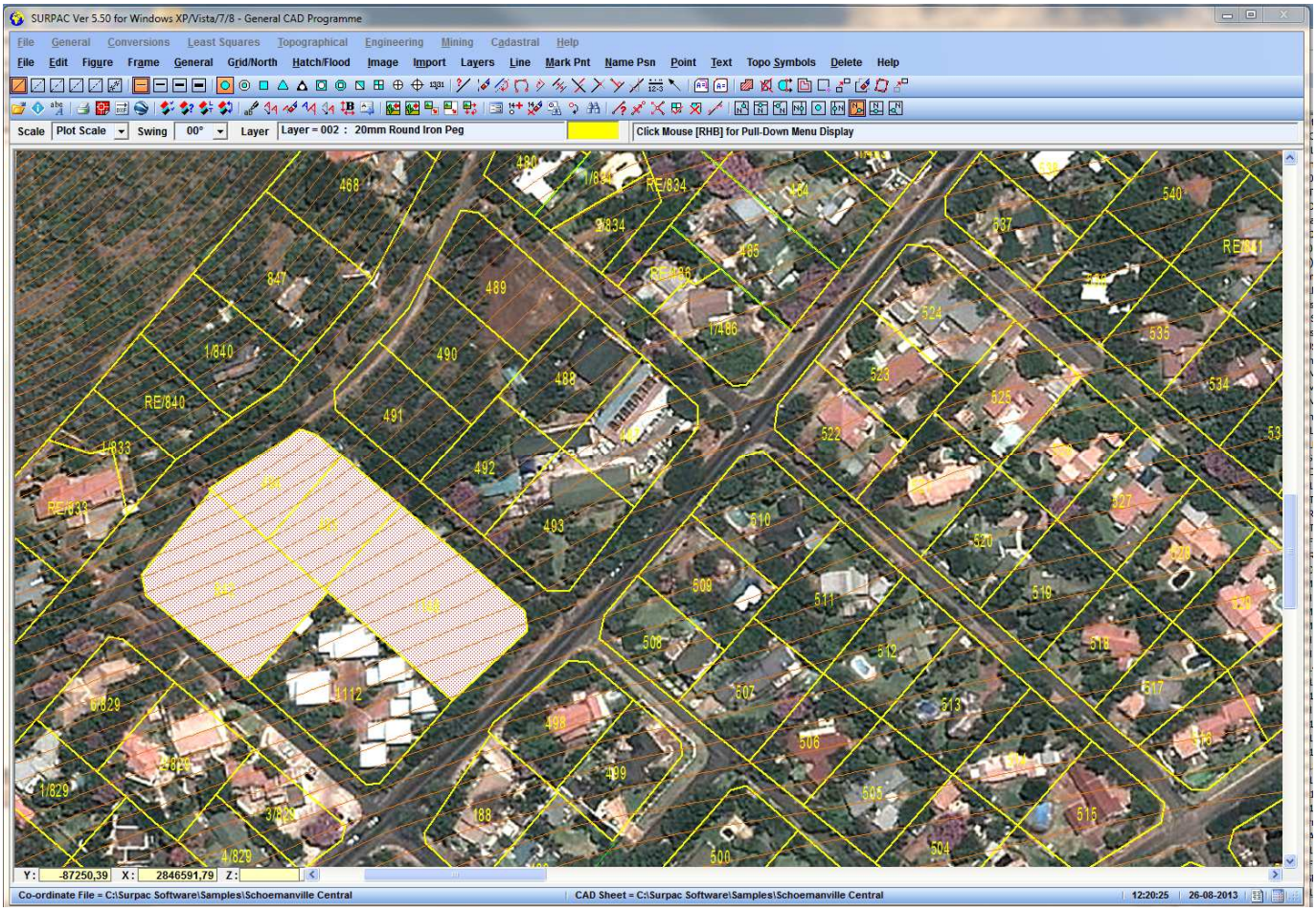
In the above example, the set up form for importing the **Shapefile** information shows that the **Shapefile** co-ordinates are in Geographical [Lat, Long] format. The option to convert the [Lat, Long] values to System [Y, X] values is selected by default. To correctly import the **Text** item attributes, select the ***.dbf** heading **TEXT_ITEM**.


SURPAC Ver 5.50 for Windows XP/Vista/7/8 - General Plan Creation/Editing/Plotting
RUTH AVENUE
MARGARET AVENUE
GRANT AVENUE
Co-ordinate File = C:\Surpac Software\Samples\L5952 (shpfile import)
General Plan - Sheet No.2

Lines and Text items Imported from a SURPAC created Shapefile into a SURPAC CAD Sheet

SURPAC will treat every **Line** and **Text** item as a pseudo polygon, enabling it to place the **Text** items in the correct places and using the correct orientation Layer, Size etc. **Lines** will also be allocated to the correct Layers and have the correct width and style.

Example of a Composite of Imported Shapefile Polygons and Google Earth Information


SURPAC Ver 5.50 for Windows XP/Vista/7/8 - General CAD Programme
File General Conversions Least Squares Topographical Engineering Mining Cadastral Help
File Edit Figure Frame General Grid/North Hatch/Flood Image Import Layers Line Mark Pnt Name Psn Point Text Topo Symbols Delete Help
Scale Plot Scale Swing 00° Layer Layer = 002 : 20mm Round Iron Peg
Click Mouse [RHB] for Pull-Down Menu Display
Y: -87250,39 X: 2846591,79 Z:
Co-ordinate File = C:\Surpac Software\Samples\Schoemanville Central
CAD Sheet = C:\Surpac Software\Samples\Schoemanville Central
12:20:25 26-08-2013

The SURPAC General CAD showing imported Polygons, Image and contours.

The above **General CAD** screen shot shows the following :-

- A background **Image** imported from **Google** Earth
- Stand boundaries imported from a **1Map Shapefile**
- Contours created in **SURPAC** using downloaded **Google Earth** point height data
- A hatched area showing the site for a proposed development.

NB : ***1Map Online*** *is a web site that contains Layers of useful and up to date information for Surveyors, planners and developers. You can apply for registration at 1Map by using the URL* ***http://1map.co.za/register***

The above demonstrates how easily preliminary composite information for planning purposes can be gathered, without the need of any field survey.

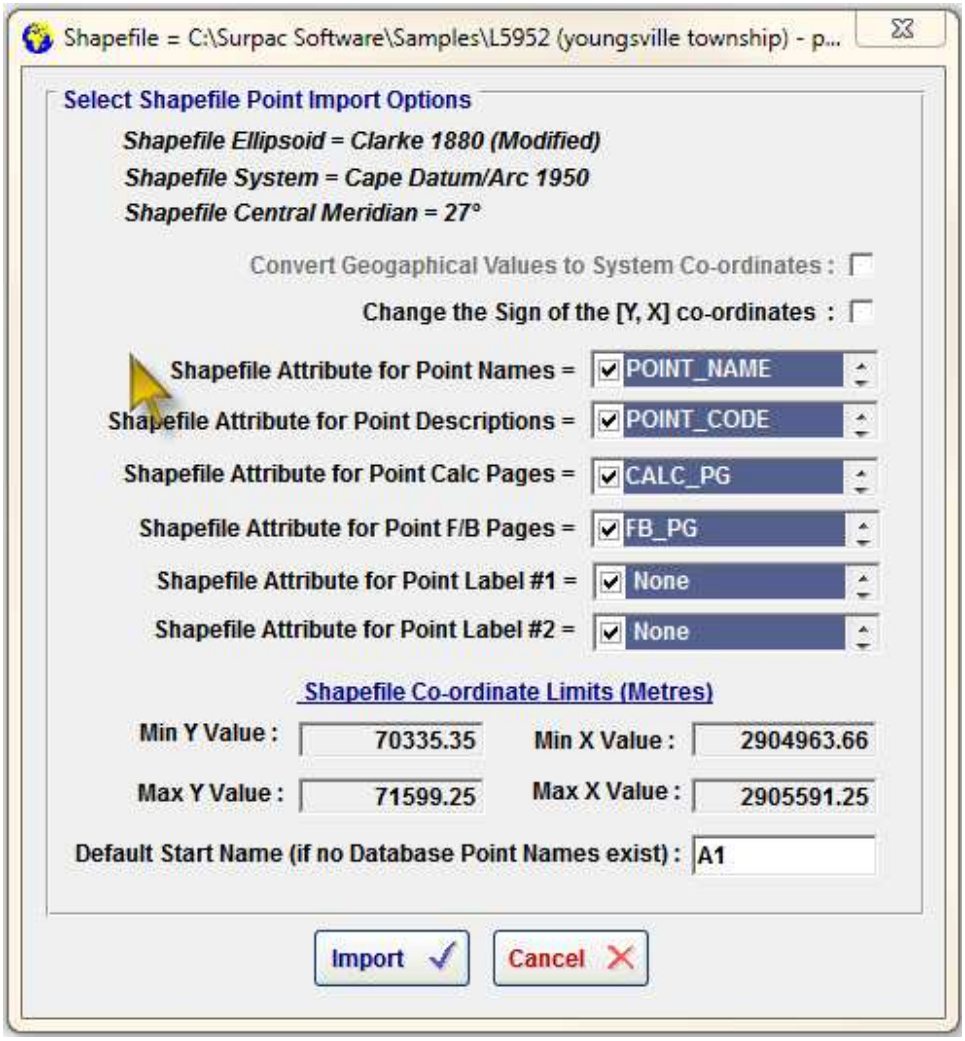
Importing Point Data into a SURPAC Co-ordinate file

Point data may be imported from a **Point Shapefile** into a **SURPAC** Co-ordinate file, via the **[File Options]** menu item ***Actions*** bar menu, when in the **Co-ordinate File Editing** programme.

In the **Co-ordinate File Editing** programme, click on the **[File Options]** menu item found in the ***Actions*** bar at the left of the co-ordinate display.

The two new **Point Shapefile** options are shown at the bottom of the displayed form (see Pg. 7). Double click on the **Import Co-ordinates from a Point Shapefile** option.

The programme will prompt for the name of the existing **Point Shapefile** and, when selected, will display the following set up form.


Shapefile = C:\Surpac Software\Samples\L5952 (youngsville township) - p...
Select Shapefile Point Import Options
Shapefile Ellipsoid = Clarke 1880 (Modified)
Shapefile System = Cape Datum/Arc 1950
Shapefile Central Meridian = 27°
Convert Geogaphical Values to System Co-ordinates :
Change the Sign of the [Y, X] co-ordinates :
Shapefile Attribute for Point Names = POINT_NAME
Shapefile Attribute for Point Descriptions = POINT_CODE
Shapefile Attribute for Point Calc Pages = CALC_PG
Shapefile Attribute for Point F/B Pages = FB_PG
Shapefile Attribute for Point Label #1 = None
Shapefile Attribute for Point Label #2 = None
Shapefile Co-ordinate Limits (Metres)
Min Y Value : 70335.35
Min X Value : 2904963.66
Max Y Value : 71599.25
Max X Value : 2905591.25
Default Start Name (if no Database Point Names exist) : A1
Import
Cancel

Set up form for Importing Data from a Point Shapefile

In the above example, the **Shapefile** co-ordinates are System [Y, X] values. The system used is displayed at the top of the screen and, therefore, the option to convert from Geographical [Lat, Long] values to system [Y, X] values is not active

From this form you can select ***.dbf** heading information that is to be allocated to each of a Point's attributes, such as **Point Name**, **Description**, **Calculation Page** etc. Once selected, click the [**Import**] button.

If the ***.dbf file** does not have a header representing the **Point Name** (you can check this by first viewing the ***.dbf** file), then set a **Start Name** for the Points, otherwise the existing default value of **A1** will be used. Point Names of A1, A2, A3 …… etc. will be allocated to the imported Points.

The **Point** information will be imported, stored and displayed in the **Co-ordinate** file listing.

Creating KML Placemarks & Polygons with linked Images and Files

SURPAC is now able to create **Google Earth KML** files for both **Placemarks** and **Polygons** that have attached Images or, Files, or both. When the Placemark or Polygon is displayed on **Google Earth**, clicking on its icon will display locality information, hypertext Links to files and the Images included for the Placemark, or Polygon.

The **Image Placemarks** (this wording is used to differentiate form standard Placemarks) are created via the **Co-ordinate File Editing** programme, and the **Image Polygons** (again to differentiate from standard Polygons) are created via the **General CAD** programme. Both programmes are found under the **SURPAC General** main menu heading.

Image Placemarks can be useful for :-

- Defining the Point's position on the earth's surface.
- Using an image or a sketch plan to clearly show the physical location of a Beacon, Reference Mark, Trig. Beacon or Town Survey Mark.
- Using an image to display a surveyed point of interest, such as a monument, grave stone, sewer or geographical feature.
- Using a Link file to describe an important surveyed feature or point of interest.

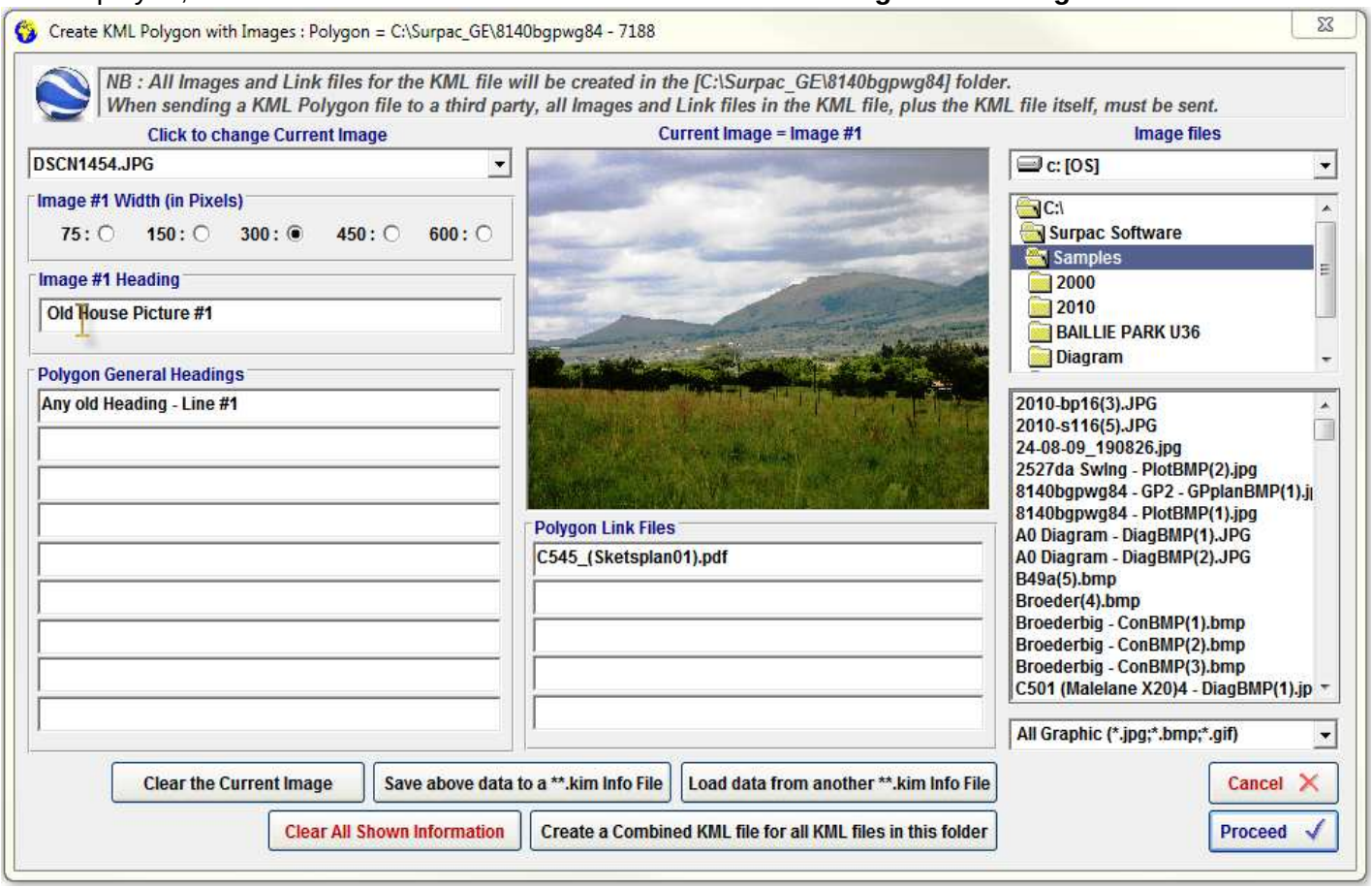
Image Polygons can be useful for :-

- Defining the position, shape and size of the Polygon on the earth's surface.
- Showing images of site itself from various viewing positions.
- Showing images of important geographical features on the site.
- Showing images of existing infrastructure or development on the site.
- Using Link files defining the Polygon/site dimensions and legal documents pertaining to the site, such as a Diagram or Deed of Transfer etc.

Although the **KML** files for both **Image Placemarks** and **Image Polygons** are created individually, all such files in a folder can be combined into a single **KML** file. Sending the information to a third party, then requires just sending the sub-folder (see below) created by **SURPAC**, as this sub-folder will contain all the necessary **KML** files (including the combined **KML** file), as well as the image and link files used in each of the **KML** files.

Creating KML Image Placemarks in SURPAC

When in the **Co-ordinate File Editing** programme, right click on the display line for the **Point** for which an **Image Placemark** is to be created. This will cause the normal pop up menu to be displayed, which now includes the new menu item **Create a Google Earth Image Placemark**.


Create KML Polygon with Images : Polygon = C:\Surpac_GE\8140bgpwg84 - 7188
NB : All Images and Link files for the KML file will be created in the [C:\Surpac_GE\8140bgpwg84] folder.
When sending a KML Polygon file to a third party, all Images and Link files in the KML file, plus the KML file itself, must be sent.
Click to change Current Image
Current Image = Image #1
Image files
DSCN1454.JPG
c: [OS]
Image #1 Width (in Pixels)
75 : 150 : 300 : 450 : 600 :
Image #1 Heading
Old House Picture #1
Polygon General Headings
Any old Heading - Line #1
C:\
Surpac Software
Samples
2000
2010
BAILLIE PARK U36
Diagram
2010-bp16(3).JPG
2010-s116(5).JPG
24-08-09_190826.jpg
2527da Swing - PlotBMP(2).jpg
8140bgpwg84 - GP2 - GPplanBMP(1).j
8140bgpwg84 - PlotBMP(1).jpg
A0 Diagram - DiagBMP(1).JPG
A0 Diagram - DiagBMP(2).JPG
B49a(5).bmp
Broeder(4).bmp
Broederbig - ConBMP(1).bmp
Broederbig - ConBMP(2).bmp
Broederbig - ConBMP(3).bmp
C501 (Malelane X20)4 - DiagBMP(1).jp
Polygon Link Files
C545_(Sketsplan01).pdf
All Graphic (*.jpg;*.bmp;*.gif)
Clear the Current Image
Save above data to a **.kim Info File
Load data from another **.kim Info File
Cancel
Clear All Shown Information
Create a Combined KML file for all KML files in this folder
Proceed

Set up form for a Google Earth Image Placemark or Image Polygon

The above form will be displayed, with its heading showing the folder Path that will be used to store the **Image Placemark/Polygon** information and the Point or Polygon **Name**.

NB : **SURPAC** will create a sub-folder under the main **SURPAC - Google Earth** folder (called "**C:\Surpac_GE**"). This sub-folder is created from the name of the current Co-ordinate file. All blanks in the file name will be replaced by underscores. In the above example, the folder used to store the information is "**C:\Surpac_GE\8140bgpwg84**", and the Polygon name is **7188**.

Entering Image File, Link file and Headings for an Image Placemark or Image Polygon

Image Files : The top, left hand drop down box, under the heading **Click to Change Current Image**, selects the current Image holder. You are able to select up to 8 Images for an Image Placemark or Image Polygon. The **File** selection box, on the right hand side of the form, will display all acceptable **Images** in the current folder path. The folder path can be changed by selecting the required path, using the **Drive** and **Directory** selection boxes above the file display. The **Image** type displayed can be selected using the file **Type** selection box below the file display.

***NB** : The only **Image** file types that may be used are **JPEG** (*.jpg), **Bitmap** (*.bmp) or **GIF** (*.gif) files.*

Clicking on a file Name in the File selection box will display the image in the image holder at the top centre of the form. To select this file as the Image for the Current Image, double click on the file Name.

Image File Headings : Each Image used for an Image Placemark or Image Polygon can have its own Heading. For example, for Image #1, position the cursor in the input box, directly below the heading **Image #1 Heading**, enter the heading required for that **Image**. Repeat this for all **Images** that are used.

Image Sizes : You can set the size of each Image included in the Placemark, or Polygon KML file. Image width values may be selected from 75 pixels up to 600 pixels. The default value is 300 pixels. These are the sizes of the Images that will be shown when you click on a Placemark, or Polygon in **Google Earth**. The actual size of the Image itself is not changed. Once in **Google Earth**, you can right Click on a displayed Image in order to display it full size.

Placemark or Polygon General Headings : At the bottom left of the form are input boxes for up to 9 **General Headings**. These headings may be used for any descriptive purpose to help describe the purpose, locality etc. of the Image Placemark or Image Polygon. These headings may be entered, edited or removed in the usual way.

Placemark or Polygon Link Files : A **Link File** is a file that the Image Placemark or Image Polygon can load up and display within **Google Earth** via a hyperlink text item.

***NB** : Link Files have to be **Printer Document** files (**.pdf) or standard **ASCII** files (*.txt).*

The input boxes directly below the heading **Placemark Link Files**, or **Polygon Link Files**, at the bottom centre of the form allow for the selection of up to 5 Link Files.

***NB** : For **Image Polygons**, **SURPAC** automatically generates and adds a text file that contains the Polygon Points system co-ordinates, geographical co-ordinates, the distances and directions, between Points and the Polygon Area. This file will automatically be included in the **KML** file's list of hyperlink **Link Files**. The file will not be shown on the above form, but the hyperlink will be visible as a part of the KML file information in **Google Earth**.*

On clicking on any of the available 5 input boxes for **Link Files**, The file selection box, on the right hand side of the form, will display all **.pdf and **.txt files in the current folder path. The folder path can be changed by selecting the required path, using the **Drive** and **Directory** selection boxes above the file display. The **Link File** type displayed can be selected using the file **Type** selection box below the file display.

Double Click on a file Name in the **File** selection box to select this file as a **Link File**. The file's name will appear in the selected **Link File** input box.

[Clear the Current Image] Button : This button will clear the currently displayed **Image**. Only use this option if you want the current **Image** to remain blank (unused). If you just want to change the existing Image for another **Image**, simply re-select a new **Image** as described above.

[Clear All Shown **Information] Button** : This button will clear all the currently displayed **Images**, **Link** Files and **Headings**. Use with caution. A warning message will be displayed in case you Click this button in error.

[Save above Data to a **.kim Info File] Button : This button allows for the intermediate saving of the information to a ****.kim** file. A ****.kim** file is a **SURPAC** file that holds all data for an Image Placemark or Image Polygon. The ****.kim** file saved will be in the sub-folder of the "**C:\Surpac_GE**" (as explained above) and will have a name associated with current Placemark or Polygon. In the above example, the path and file name will be :-

C:\Surpac_GE\L5952_(Youngsville_Township)_(Wg_27)\ 13B - KML Image Placemark.kim

[Load data from another **.kim Info File] Button : When running this programme, it will check to see if the current Placemark, or Polygon has an existing **.kim file. If so, it will

automatically load data for this Placemark, or Polygon. However, it can be useful to load, or Import data from another *.kim file. For example, if you have a large number of Placemarks to create and all Placemarks have the same, or similar Headings, then you can import these Heading and any other common information into a new Placemark, or Polygon. These data can then be edited as required.

[Create a Combined KML file for all KML files in the folder] Button : After the completion of all required Image Placemarks, or Image Polygons, the **KML** files for these items can be combined into a single **KML** file. This file will contain all the **KML** information for the Image Placemarks, or Image Polygons, in the current sub-folder. This is a convenient way of displaying all Placemarks, or Polygons, on **Google Earth** by using a single command, especially if you intend sending the information to a third party. These files will have the name **Combined_Image_PlaceMarks**, or **Combined_Image_Polygons**.

Sending Placemark or Polygon KML files to a third party : When sending a **KML** file to a third party, you must include all the **Image Files** and **Link Files** with the **KML** file. If you have created a Combined **KML** file, then safest way to do this is to include all files in the sub-folder.

If you are sending **Placemarks** you must include the small file called "**Icon38.png**" in order to get the correct symbol shown on **Google Earth**.

Displaying an Image Placemark KML on Google Earth : Once a Placemark has been created, **SURPAC** will transfer the **KML** file **Google Earth** (assuming that **Google Earth** has been installed). You should see the Placemark represented by a camera location (to differentiate it from a standard Placemark that has no Image attachments). To display the Placemark's Name, co-ordinates, headings, Link Files and Image Files, Click on the icon.

To display the contents of a hyperlink **Link Files**, right Click on the hyperlink. **Google Earth** will then switch to its display page and display the contents of the file. If the file does not display and the loading bar stays on the form, then just click the refresh button at the top of the screen.

To display the Images in full size, right Click on the Image. **Google Earth** will then switch to its display page and display the Image.

Creating KML Image Polygons in SURPAC

Image polygons are created using the **General CAD** programme (found under the **General** Menu heading).

When in the **General CAD** programme, move the mouse cursor inside the figure/stand/polygon for which you want to create an **Image Polygon** on **Google Earth**. Then right Click the mouse. The cursor will move up into the Menu area. Now Click the **Figure** menu heading and then, from the drop down menu, select the option **Create a Google Earth Image Polygon**. **NB** : The keyboard equivalent command is [**FG**]. With the cursor inside the required figure/stand/polygon, type in **FG**

You will now be prompted to enter the Number or Name for the figure/stand/polygon. The programme will then for search and locate the Lines that form the figure/stand/polygon. These Lines will be displayed in purple. If the incorrect Lines are selected, then cancel the routine

The form for selecting **Image Files**, **Headings**, **Link Files** etc. will be displayed If the incorrect Lines figure/stand/polygon have been selected, then cancel the routine and retry.

7160
Surveying Instruments in the 20th century
A photographic Collection of old Instruments
Polygon Info File = 7160_-_Data_File.txt
1920 Hilger & Watts Vernier Theodolite
1940 Cooke, Toughton $ Simms - Tilting Level

Refer to the above explanations on how to select information for the **Image Polygon KML** and how to create a **Combined_Image_Polygon KML**.

Displaying an Image Polygon KML on Google Earth : Once an Image Polygon has been created, **SURPAC** will transfer the **KML** file **Google Earth** (assuming that **Google Earth** has been installed). You should see the figure/stand/polygon shown on **Google Earth** as a half-transparent cyan polygon. To display the Polygon's Name/Number, headings, Link Files and Image Files, Click anywhere inside this displayed polygon.

NB : *The hyperlink **Link File** called *******_-_Data_File.txt** (where ***** is the given Name/Number for the Image Polygon) will automatically be included in the list of **Link Files**. This **Link File** consists of **System** and **Geographical co-ordinates** for all the polygon points, plus the polygon **area**.*

To display the contents of a hyperlink **Link Files**, right Click on the hyperlink. **Google Earth** will then switch to its display page and display the contents of the file. If the file does not display and the loading bar stays on the form, then just click the refresh button at the top of the screen.

To display an Image in full size, right Click on the Image. **Google Earth** will then switch to its display page and display the full size Image.

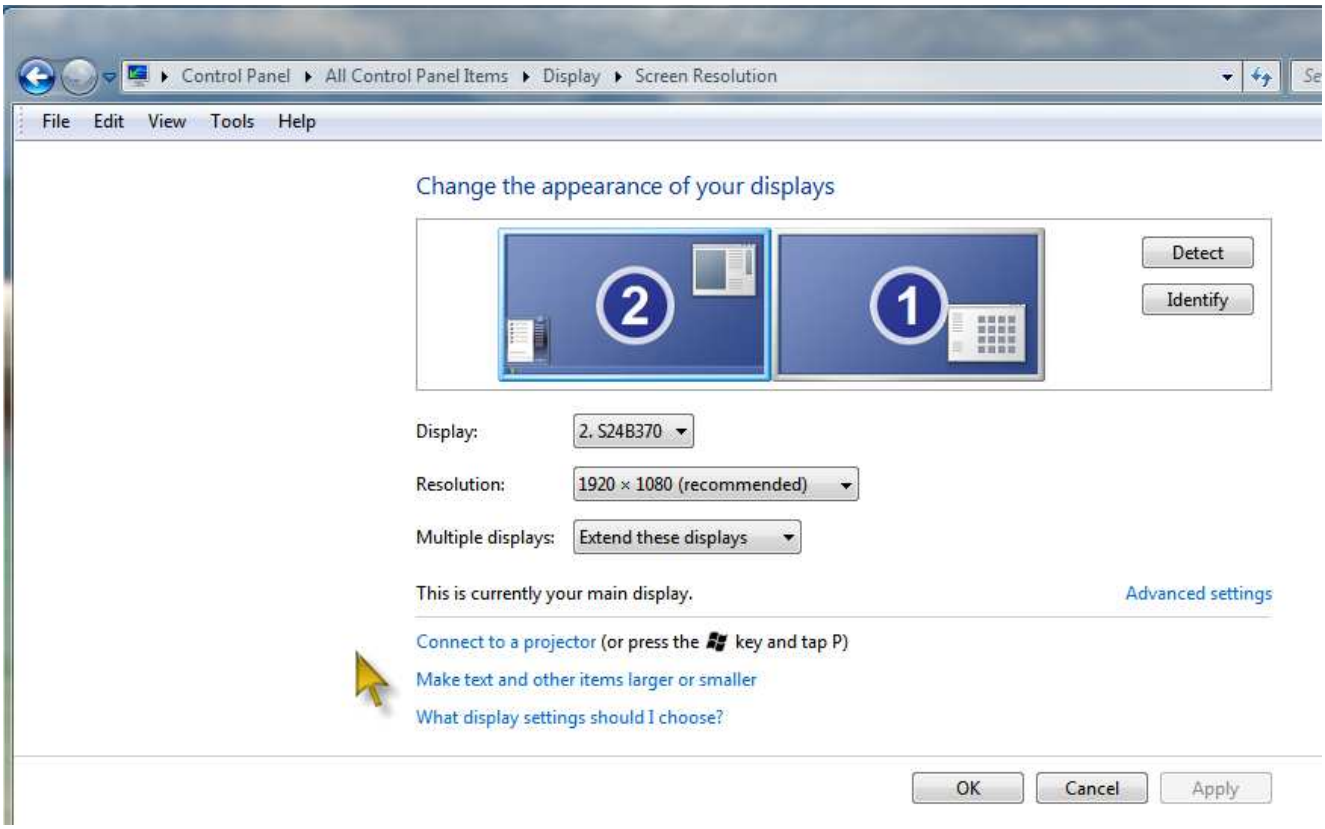
Running multiple Instances of SURPAC Software on one computer

This is a reminder that you are able to run multiple **SURPAC** sessions, or instances, on the same computer. This is especially applicable to modern Laptops equipped with flat screen LED monitors.

Previously, running two monitors from one computer usually meant having two graphic cards installed and even then this type of set up often proved problematical.

The image on the next page shows an example of a dual monitor set up, with both monitors running from the same Laptop. The equipment used is a **Hewlett Packard Pavilion dv7** Laptop, running **Microsoft Windows 7**. The laptop is equipped with the normal 12 pin monitor cable output port, plus an HDMI cable output port. The monitors are both Samsung 24" screens, having both a 12 pin monitor cable input port and an HDMI input port.

Monitor #1 is attached via the 12 pin cable and Monitor #2 is attached via the HDMI cable.


Control Panel ▸ All Control Panel Items ▸ Display ▸ Screen Resolution
File Edit View Tools Help
Change the appearance of your displays
2
1
Detect
Identify
Display: 2. S24B370
Resolution: 1920 × 1080 (recommended)
Multiple displays: Extend these displays
This is currently your main display.
Advanced settings
Connect to a projector (or press the key and tap P)
Make text and other items larger or smaller
What display settings should I choose?
OK
Cancel
Apply

Windows Set up for an extended dual display

In ***Windows*** you need to set up the configuration for an extended display over the two screens. Do this with the Laptop lid closed. Otherwise it will show that you have 3 screens. Follow the path shown in the above image (**Control Panel>All Control Panel Items>Display>Screen Resolution**), or simply right Click on the screen and from the pop-up menu select **Screen Resolution**. Set the **Multiple displays** option to "Extend these displays".

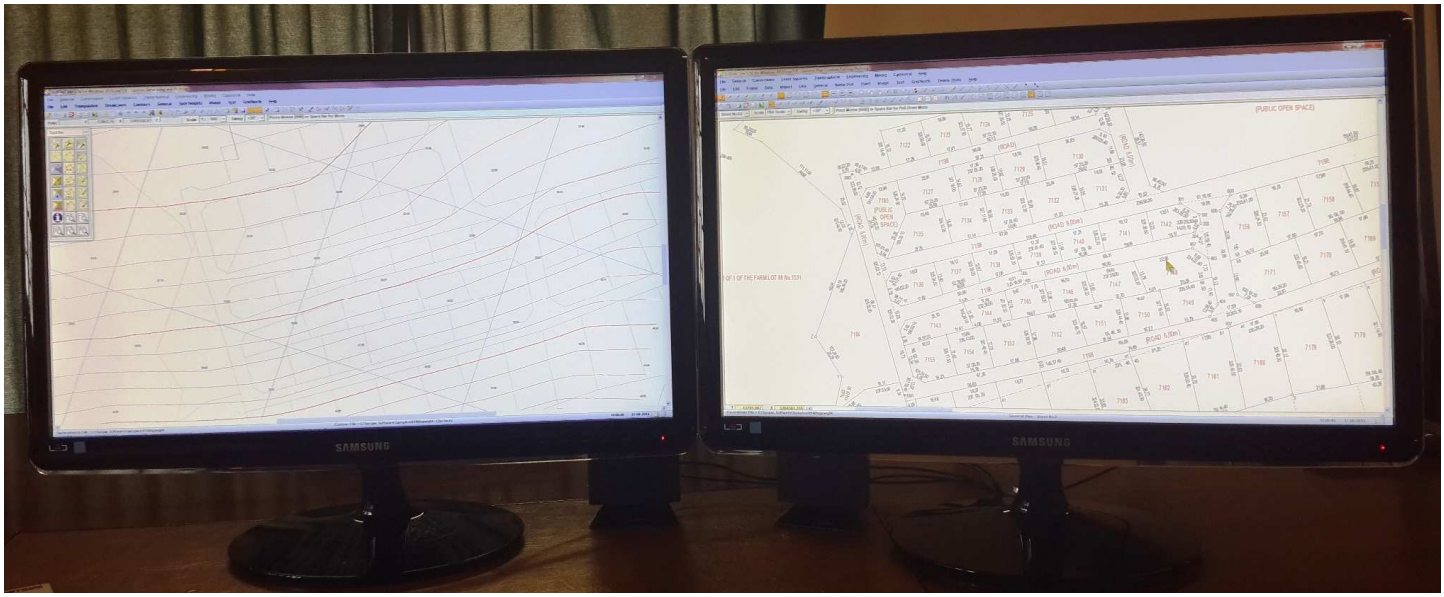
The first instance of **SURPAC** is then run and its display is moved on to Monitor #1. The second instance of **SURPAC** is run and its display left on Monitor #2. These can be swapped around, if required.

Both instances of **SURPAC** should be using the same **Co-ordinate file**. You can then, for example, display a **CAD** programme on one screen and calculations on the other screen. You can also run two **CAD** programmes, as shown below.

Changes made on one instance of **SURPAC** will be reflected on the other. For example, if you Add a Point using the **General CAD** programme on one of the screens, that Point will be shown in the co-ordinate listing on the other screen.

Sometimes you might need to refresh a **CAD** screen to show new Points added through one of the other programmes.

Monitor #1 ***Monitor #2***



Running two instances of SURPAC from one Laptop – Contour CAD and General Plan CAD

Locating and Adding the Nearest Bench Marks (RSA only)

Bench Marks in South Africa and their use in SURPAC Software

The office of **National Geo-spatial Information** (within the Department of Rural Development and Land Reform) has issued a list of **Bench Marks** covering the Republic of South Africa. The **Bench Mark** heights (Orthometric heights) were determined using precise levelling and they represent the most accurate height reference system for relating surveys to the South African reference geoid.

It is long been common practise for Surveyors to determine a height reference for a survey by means of Trigonometrical levelling from national Trig beacons. Whilst, in general, there is nothing wrong with this technique, Surveyors should be aware that in some areas of the country there are height deviations between the Trig heights and the **Bench Mark** heights of up to several metres.

For Surveyors who want to connect their surveys to the national **Bench Mark** system, **SURPAC** now provides a programme that locates and displays the nearest **Bench Marks** to the survey area and allows the loading of User selected **Bench Marks** into the current Co-ordinate file.

Currently, this programme is limited to the geographical area of the **Republic of South Africa**, and to surveys whose co-ordinate system is defined as being in the "**WG**" (WGS 84 Ellipsoid) System (in South Africa, the "**Hartebeesthoek94 Datum**").

It is not necessary for the User to define any source file for the location of the **Bench Marks** as **SURPAC** has a built in Source file called "**BenchMarksRSA.sbm**". This file must exist in the folder in which **SURPAC** Software is installed (usually the folder "**C:\Surpac Software**").

The above Source file contains the double precision geographical positions (Latitude and Longitude) of about 18,000 **Bench Marks** throughout the Republic of South Africa, approximately co-ordinated in the "**Hartebeesthoek94 Datum**" system.

This programme will automatically search and extract the required **Bench Mark** information from the above Source file.

Since the Source file **Bench Marks** are stored in [**Lat**, **Long**] format, any Degree Square boundaries become irrelevant to the programme. Surveys can be located close to any Degree Square boundary, and the programme will still generate its own, temporary "Degree Square" of Points, centered about the Survey, or any defined Point in the Survey. Data may be drawn from different Degree Squares for any given Survey.

The programme offers User options for both the selection of **Bench Marks**, and the display mode used, namely :-

- The **Search Centre position** may be User selected,
- The **number of located Bench Marks** displayed may be set according to a required **maximum number**, or a required **maximum search radius**,
- The **display of located Bench Marks** may be in order of **Distance**, **Direction** or **Point Name** or **Height Difference** (If the **Google Earth DTM** height values are displayed).
- Any of the **located Bench Marks** in the displayed list may be tagged as "**not required**", to prevent them from being added to the Co-ordinate file, or displayed on **Google Earth**.
- Located **Bench Marks** in the displayed list will have their **Degree Square** values shown.
- An **output** of the displayed list of located **Bench Marks** may be made to the **Printer**, an **ASCII** file, an **Excel** file or the **Clipboard**.
- The **located Bench Marks** in the displayed list, marked as "**required**" (i.e. the selected **Bench Marks**) may be **added** to the current **Co-ordinate File**.
- The list of **Bench Marks** may also be displayed on **Google Earth**.

The **Google Earth DTM** may also be used to import and display the **Google Earth** heights of the located **Bench Marks**. In this case, the differences between the actual **Bench Mark** heights and their **Google Earth DTM** values will be displayed. These height differences may be

used to adjust (raise or lower) a set of imported grid heights from the **Google Earth DTM**, for contouring purposes.

The **Bench Mark** Y, X co-ordinates are those supplied by the **NGI** and, unfortunately, their positions are only approximate, having an accuracy in the order of only ± 15 metres. We have requested from the **NGI** images of the locality sketches that could then be attached to a **KML** display of a set of **Bench Marks**. This would make the location of the **Bench Marks** in the field a lot simpler. As yet, we have had no response to this request from the **NGI**. Hopefully, we will be able to add this feature at a later date.

Apart from using the **Bench Marks** to control the heighting of surveys, such as control surveys for road, rail or pipe line construction, the **Bench Marks** around an area of proposed development can be used to adjust a set of imported **Google Earth DTM** grid heights, used for example, for the purpose of a preliminary contour display/model of a proposed development site. In general, there is a height shift between **Google Earth DTM** interpolated heights and the actual ground heights represented by the **Bench Marks**. A comparison between the two sets of heights can be used to determine the local height shift to be applied to the **Google Earth DTM** values.

When comparing **Google Earth DTM** heights with the **Bench Mark** heights, it is important to bear in mind the following limitations :-

1. Due to the approximate positioning of the **Bench Marks**, avoid points that lie on steep ground.
2. Some **Bench Marks** are studs placed on the plinths of Trig beacons. In these cases, the heights of the Trig pillars (normally 1,4m) need be taken into account.

Using the "Locate and Add Nearest Bench Marks" programme

NB : *This programme forms a part of the **Conversions Module** and this Module must be an active part of the **SURPAC** License in order to be able to access the programme.*

The programme is loaded from the **Conversions Menu**, when selecting the **Locate and Add Nearest Bench Mark** Menu Item.

If the current Co-ordinate file is empty, the programme will display a warning message and abort as the Co-ordinate file must contain at least one Point in order for this programme to work.

The Co-ordinate file should have appropriate constants set. If no constants are used, then both the Y an X ordinates must have their full values.

As a starting default, the programme will assume the [Y, X] search position as being the centre of gravity of all existing Points in the current Co-ordinate file. The programme will use the further defaults of a Search Radius of 50Km and the number of Points to display as 10.

The results of this default search will be displayed. You may now change any of the search parameters required, as mentioned on the previous page

Each displayed **Bench Mark** will initially have a green "tick" displayed next to it. This implies that the **Bench Mark** is a "required" **Bench Mark** and which would be added to the current Co-ordinate file when the **[Store and Exit]** Button is clicked.

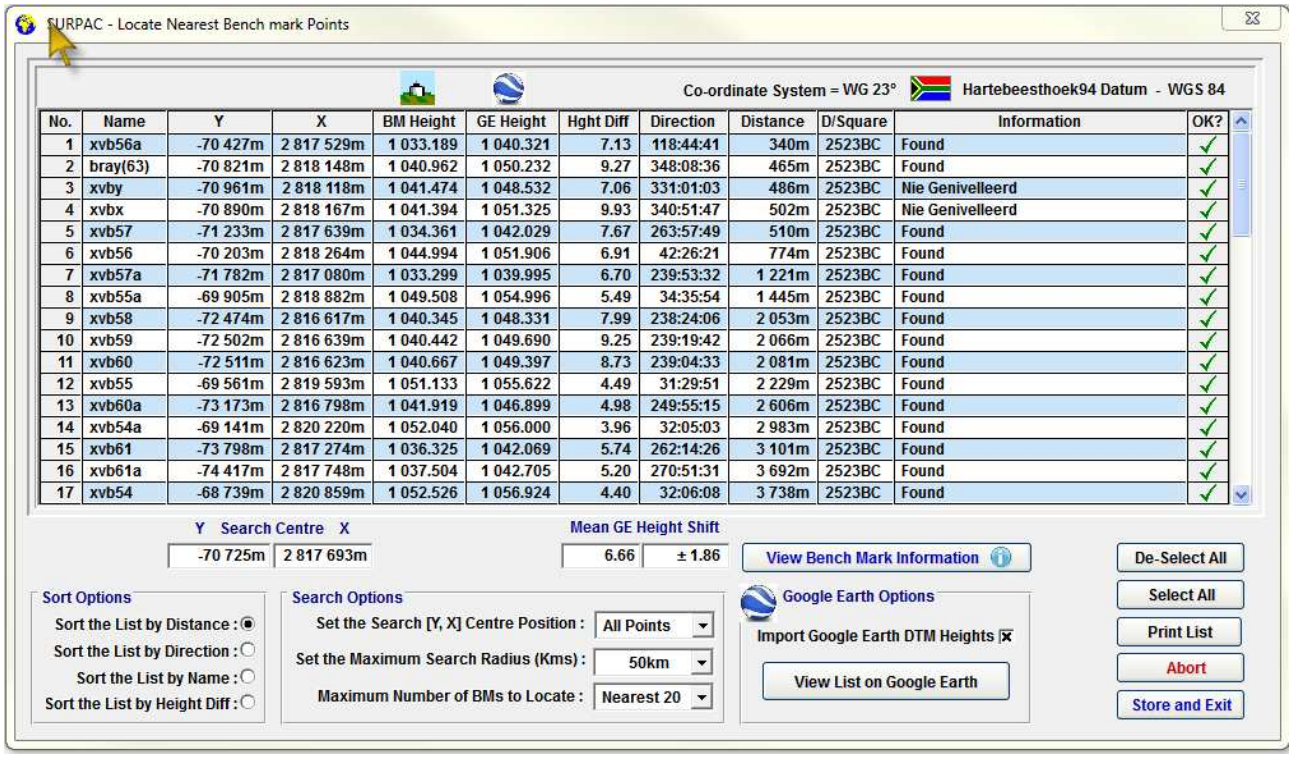
If any **Bench Mark** is not required, then click on that **Bench Mark's** green "tick". The symbol will be changed to a red "cross", and the **Bench Mark's** co-ordinate display will be changed to an italic font. This **Bench Mark** will now be flagged as "not required", and will not be added to the current Co-ordinate file. Clicking a Point's red "cross" will reverse the above process.

Click the **[Print List]** Button to send all those located and selected **Bench Marks** to the **SURPAC** Printing form. From this form display, this list may then be sent to the current **Printer**, to a User defined **ASCII** file, to an **Excel** file, or to the Windows **Clipboard**.

When the **[Store and Exit]** Button is clicked, all located **Bench Marks** displayed in the list, and having the green "tick" symbol next to them, will be **added** to the current **Co-ordinate File**.

In the form area designated "**Google Earth options**", it is possible to either import interpolated heights for the **Bench Mark** positions by interrogating the **Google Earth DTM**, or to send the list of selected **Bench Marks** to **Google Earth** for a spatial view of the set of **Bench Marks**. By

clicking on a **Bench Marks** symbol on the **Google Earth** display, the **Bench Mark's** co-ordinate and height information is displayed, along with the Height Difference (if applicable) and any information related to the **Bench Mark**.
If the **Google Earth DTM** heights are displayed, the programme form will display the **Mean Google Earth Height Shift** and its Standard Deviation, for all selected (ticked) **Bench Marks**.



No.	Name	Y	X	BM Height	GE Height	Hght Diff	Direction	Distance	D/Square	Information	OK?
1	xvb56a	-70 427m	2 817 529m	1 033.189	1 040.321	7.13	118:44:41	340m	2523BC	Found	✓
2	bray(63)	-70 821m	2 818 148m	1 040.962	1 050.232	9.27	348:08:36	465m	2523BC	Found	✓
3	xvby	-70 961m	2 818 118m	1 041.474	1 048.532	7.06	331:01:03	486m	2523BC	Nie Genivelleerd	✓
4	xvbx	-70 890m	2 818 167m	1 041.394	1 051.325	9.93	340:51:47	502m	2523BC	Nie Genivelleerd	✓
5	xvb57	-71 233m	2 817 639m	1 034.361	1 042.029	7.67	263:57:49	510m	2523BC	Found	✓
6	xvb56	-70 203m	2 818 264m	1 044.994	1 051.906	6.91	42:26:21	774m	2523BC	Found	✓
7	xvb57a	-71 782m	2 817 080m	1 033.299	1 039.995	6.70	239:53:32	1 221m	2523BC	Found	✓
8	xvb55a	-69 905m	2 818 882m	1 049.508	1 054.996	5.49	34:35:54	1 445m	2523BC	Found	✓
9	xvb58	-72 474m	2 816 617m	1 040.345	1 048.331	7.99	238:24:06	2 053m	2523BC	Found	✓
10	xvb59	-72 502m	2 816 639m	1 040.442	1 049.690	9.25	239:19:42	2 066m	2523BC	Found	✓
11	xvb60	-72 511m	2 816 623m	1 040.667	1 049.397	8.73	239:04:33	2 081m	2523BC	Found	✓
12	xvb55	-69 561m	2 819 593m	1 051.133	1 055.622	4.49	31:29:51	2 229m	2523BC	Found	✓
13	xvb60a	-73 173m	2 816 798m	1 041.919	1 046.899	4.98	249:55:15	2 606m	2523BC	Found	✓
14	xvb54a	-69 141m	2 820 220m	1 052.040	1 056.000	3.96	32:05:03	2 983m	2523BC	Found	✓
15	xvb61	-73 798m	2 817 274m	1 036.325	1 042.069	5.74	262:14:26	3 101m	2523BC	Found	✓
16	xvb61a	-74 417m	2 817 748m	1 037.504	1 042.705	5.20	270:51:31	3 692m	2523BC	Found	✓
17	xvb54	-68 739m	2 820 859m	1 052.526	1 056.924	4.40	32:06:08	3 738m	2523BC	Found	✓

The "Locate and Add Nearest Bench Marks" programme display

Display of Bench Marks on Google Earth, showing information for a selected Bench Mark

My thanks to Corné de Jager, Land Surveyor, for suggesting the incorporation of this feature.

New Google Earth features in SURPAC

New Icons for SURPAC Google Earth Displays

A new set of updated and improved icons is now used by **SURPAC** Software, as follows :-

- Trigonometrical Beacons

- Town Survey Marks

- Bench Marks

- Survey Beacons/Points

- Image Placemarks or Polygons

Please note that the "**hot Spot**" that identifies the position of the item is the bottom centre of the icon.

Drawing Arcs, Circles and Dashed/Dotted Lines on Google Earth

The **KML** language used to generate **KML** files on **Google Earth** only provides for limited line drawing options. Available options are line width and line colour and apply to straight lines only.

SURPAC has always provided for line styling (dotted lines, dashed lines etc.) by means of adding extended functions to handle such lines.

New functions have now been added to the **SURPAC General CAD** programme to enable the plotting of **Arcs** and **Circles** on **Google Earth** via a **KML** file. Arcs may be solid, dotted or dashed.

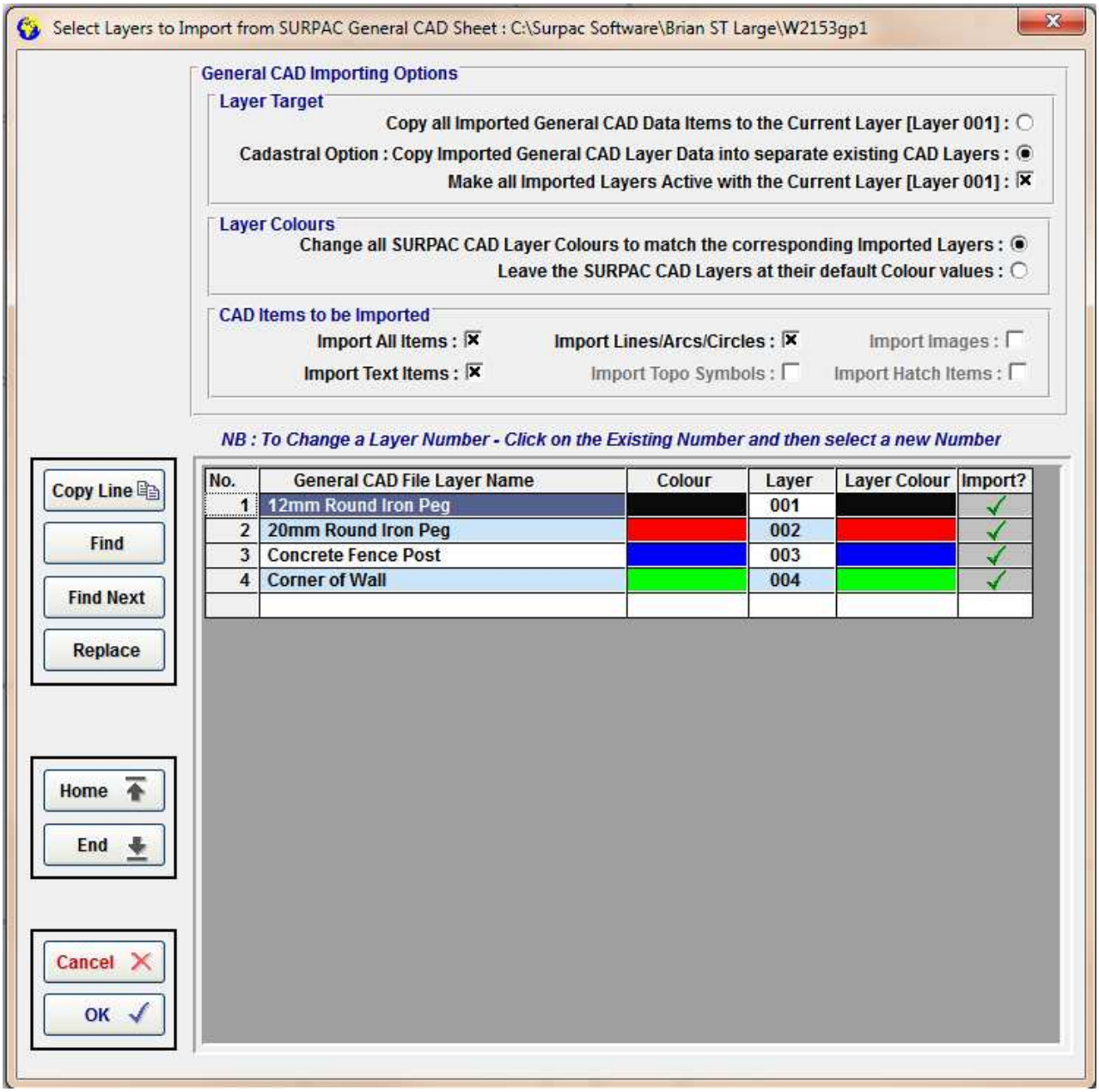
Example of a SURPAC KML file displayed on Google Earth, including Arcs and Circles

Importing Data from one SURPAC General CAD Sheet to another

This function has been extended to allow Users to select, or de-select, the data items that are to be imported. Users can now select the following when importing from another **General CAD Sheet** :-

- **All** Items (Default)
- **Lines**/Arcs and Circles
- **Text** Items
- **Images**
- Topo **Symbols**
- **Hatch** Items (polygons)

As before, Users can also select which **Layers** to import.


Select Layers to Import from SURPAC General CAD Sheet : C:\Surpac Software\Brian ST Large\W2153gp1
General CAD Importing Options
Layer Target
Copy all Imported General CAD Data Items to the Current Layer [Layer 001] :
Cadastral Option : Copy Imported General CAD Layer Data into separate existing CAD Layers :
Make all Imported Layers Active with the Current Layer [Layer 001] :
Layer Colours
Change all SURPAC CAD Layer Colours to match the corresponding Imported Layers :
Leave the SURPAC CAD Layers at their default Colour values :
CAD Items to be Imported
Import All Items :
Import Lines/Arcs/Circles :
Import Images :
Import Text Items :
Import Topo Symbols :
Import Hatch Items :
NB : To Change a Layer Number - Click on the Existing Number and then select a new Number
Copy Line
Find
Find Next
Replace
Home
End
Cancel
OK
No.
General CAD File Layer Name
Colour
Layer
Layer Colour
Import?
1
12mm Round Iron Peg
001
2
20mm Round Iron Peg
002
3
Concrete Fence Post
003
4
Corner of Wall
004

Option form used for Importing Data from one General CAD Sheet to another

New Line Commands for the SURPAC General CAD programme

The following **Line Commands** have been added to the **General CAD** programme :-

[LC] - Line Copy

The Cursor must be positioned near the **Line** to be **Copied**. The programme will then define the located Line by displaying it in purple. The Cursor will jump to the closest Line terminal of the defined Line. The copy of the original Line may then be :-

- **Moved** (by moving the Cursor or pressing the Keyboard arrow keys),
- **Scaled** by using either the **[+]** or **[-]** Commands, or
- **Rotated** by using the **[<]** or **[>]** Commands.

Once the required Position, Length and Direction for the Line have been reached, use the [**Enter**] Command to Place the Line. Unless the Snap Mode has been disabled, the Line terminal at which the Cursor is situated will "snap" onto the nearest existing defined Snap Item within range of the current Snap Radius. The original Line will not be erased or modified.

[LM] - Line Move

The Cursor must be positioned near the **Line** to be **Moved**, and the **[LM]** Command given. The Programme will then define the located Line by displaying it in purple. The Cursor will jump to the closest Line terminal of the defined Line. The located Line may then be :-

- **Moved** (by moving the Cursor, or pressing the Keyboard arrow keys),
- **Scaled** by using either the **[+]** or **[-]** Commands, or
- **Rotated** by using the **[<]** or **[>]** Commands.

Once the required Position, Length and Direction for the Line have been reached, use the [**Enter**] Command to Place the Line. Unless the Snap Mode has been disabled, the Line terminal at which the Cursor is situated will "snap" onto the nearest existing defined Snap Item within range of the current Snap Radius. The original, located Line will be removed.

Locating and Adding My Nearest Stations

The "My Stations" files

SURPAC now allows you to create and store two "**My Stations**" files, one for the **Clarke 1880** (**Modified**) ellipsoid (e.g. the RSA "Lo" datum, Arc 1950, Arc1960, UTM etc.), and the **WGS 1984** ellipsoid (e.g. RSA Hartebeeshoek94 datum, UK National GPS Network, New Zealand Geodetic Datum (NZGD2000), UTM etc.).

These files are called "**My Stations (Lo)**" and "**My Stations (WG)**" respectively, and are stored in the same folder as the **SURPAC** application, usually the "C:\Surpac Software" folder.

The purpose of these files is to allow Surveyors to store their own **Stations** (or any other required points) in the above files and to have the ability to locate and import the nearest of these **Stations** into any Co-ordinate file.

Each **Station** stored in either of the two "**My Stations**" files consists of the following data :-

- ***Name***
- ***Latitude***
- ***Longitude***
- ***Y Co-ordinate (or Easting)***
- ***X Co-ordinate (or Northing)***
- ***System (e.g. WG 27°, Lo 19°, Zone 35 etc.)***
- ***Height***
- ***Aux. Height***
- ***Field #1 (as set in the Source file)***
- ***Field #2 (as set in the Source file***
- ***Description***
- ***Source File Path/Name***

When displaying the nearest **Stations**, the following are also shown :-

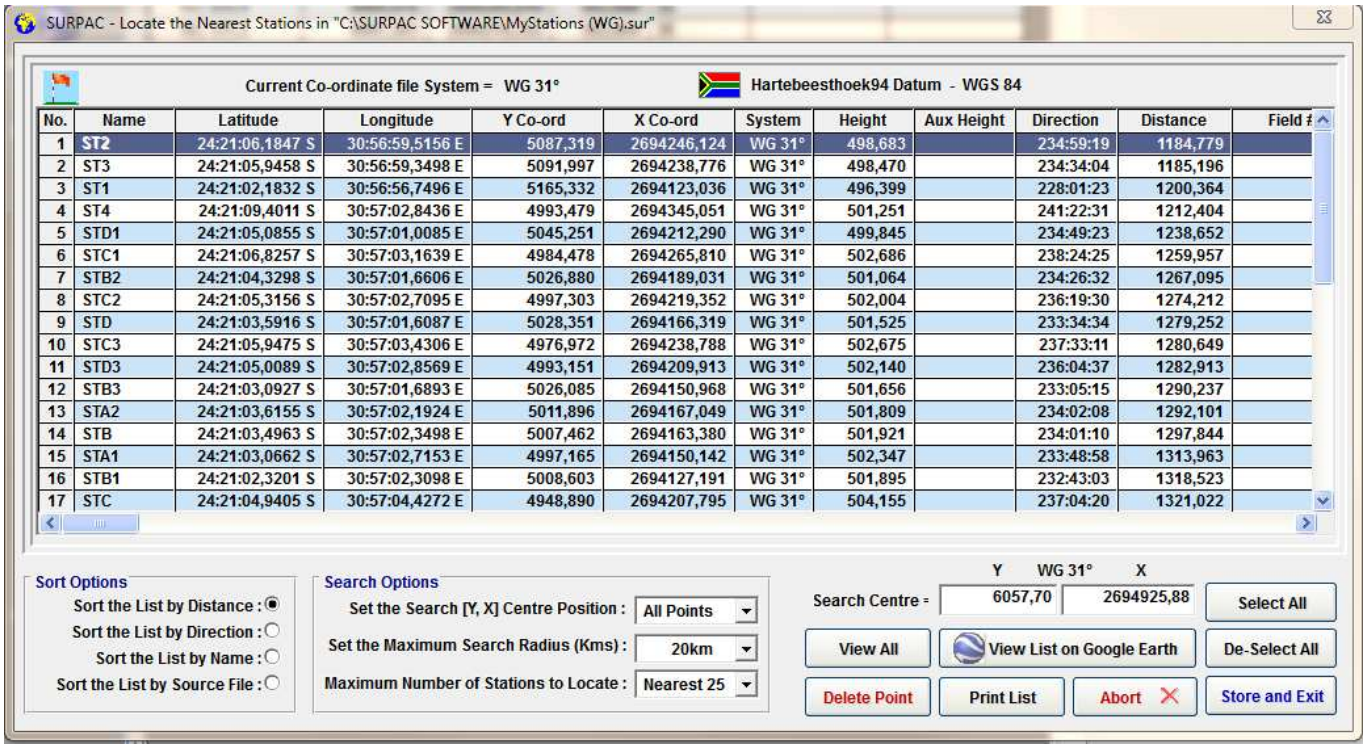
- ***Direction***
- ***Distance***

Which are determined from the currently chosen **Search Centre** position.

Since the two "**My Stations**" files are stored in [**Lat**, **Long**] format, any Degree Square boundaries become irrelevant to the programme. Surveys can be located close to any Degree Square boundary, and the programme will still generate its own, temporary "Degree Square" of Points, centered about the Survey, or any User defined Point in the Survey. Data may be drawn from different Degree Squares for any given Survey.

The programme offers User options for the display mode of the selected **Stations**, namely :-

- The **Search Centre position** may be User selected,
- The **number of located Stations** displayed may be set according to a required **maximum number**, or a required **maximum search radius**,
- The **display of located Stations** may be in order of **Distance**, **Direction**, **Point Name** or **Source File**.
- Any of the **located Stations** in the displayed list may be tagged as "**not required**", to prevent them from being added to the Co-ordinate file, or being displayed on **Google Earth**.
- An **Output** of the displayed list of located and selected **Stations** may be made to the **Printer**, an **ASCII** file, an **Excel** file or the **Clipboard**.
- The **located Stations** in the displayed list, marked as "**required**" (i.e. the selected **Stations**) may be **added** to the current **Co-ordinate File**.
- The list of required **Stations** may also be displayed on **Google Earth**.



The "Locate and Add My Nearest Stations" programme display

Adding Stations to the "My Stations (Lo)" or "My Stations (WG)" files

Load the **Co-ordinate File** that contains the required **Stations** that are to be added to the "**My Stations**" file, making it the current **Co-ordinate File**. **SURPAC** will note the System of the current **Co-ordinate File** and will open the appropriate "**My Stations**" file (i.e. "**Lo**" or "**WG**").

Mark (highlight) a **Station**, or **Stations**, that are to be added to the " **My Stations**" file :-

To Highlight a block of Stations *: Use the "**Click and drag**" method or the **[Shift] + Click** method.*

To Highlight Separate Stations *: Use the **[Ctrl] + Click** method.*

Once all required **Stations** have been highlighted, the cursor should be over either the last **Station** selected, or over the green tick box near the top right of the display. In either case Click the mouse Right hand button to display the Co-ordinate display's pop-up menu.

On this menu, select the **Add Station(s) to "My Stations (WG)" file** or **Add Station(s) to "My Stations (Lo)" file**, as the case may be.

If a **Station** of the same **Name** and originating from the same **Co-ordinate File** already exists in the "**My Stations**" file, the programme will prompt you to either accept the existing **Station** values, or to overwrite the values.

NB : ***Stations*** *having duplicate **Names** can be stored in the "**My Stations**" files, as long as they originate from different **Source** files.*

*The term "**Station**" is used throughout this discussion, however any Point, such as a Reference Mark, Outside Figure Point etc. may be stored in either of the "My Station" files.*

Using the "Locate and Add My Nearest Stations" programme

NB : *This programme forms a part of the **Conversions Module** and this Module must be an active part of the **SURPAC** License in order to be able to access the programme.*

The programme is loaded from the **Conversions Menu**, when selecting the **Locate and Add My Nearest Stations** Menu Item.

If the current **Co-ordinate File** is empty, the programme will display a warning message and abort as the **Co-ordinate File** must contain at least one Point in order for this programme to work.

The **Co-ordinate File** should have appropriate constants set. If no constants are used, then both the Y an X ordinates must have their full values.

As a starting default, the programme will assume the [Y, X] (or E, N) search position as being the centre of gravity of all existing Points in the current **Co-ordinate File**. The programme will use the further defaults of a Search Radius of 20Km and the Number of Points to display as 25.

The results of this default search will be displayed. You may now change any of the search parameters required, as mentioned on the previous page.

NB : *The information line displayed for each **Station** is too long to be displayed in total on a standard display page. To view the full **Station** information, use the horizontal scroll bar at the bottom of the data display*.

Each displayed **Station** will initially have a green "tick" displayed next to it (at the right hand side of the display). This implies that the **Station** is a "required" **Station** which would be added to the current **Co-ordinate File** when the **[Store and Exit]** Button is clicked, or displayed on **Google Earth** when the [**View List on Google Earth**] Button is clicked.

If any **Station** is not required, then either click on that **Station**'s green "tick", or Double Click on any one of the displayed **Station**'s data items. The symbol will be changed to a red "cross", and the **Bench Mark's** co-ordinate display will be changed to a grey italic font. This **Station** will now be flagged as "not required", and will not be added to the current **Co-ordinate File**, or displayed on **Google Earth**. Clicking a Point's red "cross", or Double Clicking on any one of the displayed **Station**'s data items will reverse the above process.

NB : *The [**Select All**] and [**De-Select All**] Buttons can be used to designate all **Stations** as Selected (**Required**), or De-Selected (**Not Required**), respectively.*

A **Station** may be **Deleted** from the "**My Stations**" file by highlighting the required **Station** line (by Clicking on it) and then Clicking the [**Delete Point**] Button. Once a **Station** has been **Deleted**, it can only be replaced by **Adding** it from the appropriate **Co-ordinate File**, as described above.

Click the **[Print List]** Button to send all those located and selected **Stations** to the **SURPAC** printing form. From this form, this list may then be sent to the current **Printer**, to a User defined **ASCII** file, to an **Excel** file, or to the Windows **Clipboard**.

NB : *Due to the width of the information data lines for the **Stations**, it is best to send the display to an **Excel**, where the full display information data is included*

The display of **Stations** can be switched to show the entire data set of **Stations** in the "**My Stations**" file by Clicking the [**View All**] Button. This Button's caption will then be changed to [**View Nearest**], and, by again Clicking this Button, you will be returned to the previously displayed list of the nearest **Stations**. When in the **View All** mode you cannot sort by Distance or Direction and you cannot change search items such as Range, Number and Search Centre.

When the **[Store and Exit]** Button is clicked, all located **Stations** displayed in the list, and having the green "tick" symbol next to them, will be **added** to the current **Co-ordinate File**.

As long as **Google Earth** is installed on the computer, the selected list of **Stations** may be sent to **Google Earth** (via a generated **KML** file) to provide a spatial view of the set of **Stations**. This function is only applicable if the current **Co-ordinate File** uses a System based on the **WGS 1984** ellipsoid

By clicking on the [**View List on Google Earth**] Button (if active) all the selected (required) **Stations** will be displayed on **Google Earth**. Clicking on any of these displayed **Stations** in **Google Earth** will display the **Station**'s system, co-ordinate and height information, Latitude, Longitude and point description.

Display of Stations on Google Earth, showing information for a selected Station

My thanks to Land Surveyors Xan Swart and Willem Knoetze for suggesting this feature.

The full set of **Google Earth** icons used by **SURPAC** Software, is now :-

- **- Trigonometrical Beacons**
- **- Town Survey Marks**
- **- Bench Marks**
- **- Survey Beacons/Points**
- **- Image Placemarks or Polygons**
- **- My Stations**

*Please note that the "**hot Spot**" that identifies the position of the item is the **bottom centre** of the icon.*

General Modifications

Importing Google Earth Polygons and Points – These routines have been modified to be able to handle differing techniques of **KML** file creation in different applications.

Google Earth KML Polygons can be imported using the **General CAD** programme and **KML Points** can be imported using the **Co-ordinate File Editing** programme.

Creating Hatched (filled) Polygons for Exporting to Google Earth – In the Upgrade for **Version 5.50**, I explained how it is possible to set up a **Hatched Image Polygon** in the **General CAD** programme, used for creating a **KML** file and exporting it to **Google Earth**. This same routine may be used for creating standard **Hatched Polygons** (without any image or document attachments) as follows :-

In the **General CAD** programme, Click the **Hatch/Flood** menu heading and then select the menu items to set the required **Hatch Colour** and **Hatch Type** and then **Hatch** the selected **Polygon**.

From the **File** menu heading, select the item **Create a KML Google Earth Image Polygon**. Enter the required **Name** for the **Polygon** and, when the **Image and Link** file option form is displayed, just Click on the **[Proceed]** button.

Google Earth display of a Hatched (filled) Polygon from the General CAD programme

SURPAC for Windows XP/Vista/7/8 Version 5.62

Running SURPAC Software on a Windows 8.1, 10-inch tablet

In the past year or so, I have been asked by a number of **SURPAC** Users if it is not possible to run **SURPAC** on a small, hand held tablet. Up until now, I have had to say that it was not possible. However, with the advent of small, 10-inch notepads/tablets, running under ***Microsoft*** **Windows 8.1**, this has all changed.

I recently purchased an **ASUS Transformer T100** in order to see how it runs in general, and in particular how it runs **SURPAC**.

The T100's tablet is detachable from the keyboard making it both portable and flexible. The 10-inch ***Windows*** 8.1 tablet is just the right size to use as a tablet, and it weighs only 1.2 kgs.

The T100 comes with the Intel processor Atom Z3740, 2GB RAM and 64GB storage. It also has a 1366 x 768-pixel display with full touch screen functions.

It has a slim, detachable keyboard with a USB 3.0 for a mouse, external hard etc., a micro SD port, plus a 2-megapixel camera. The T100 also comes preloaded with the full versions of ***Microsoft*** Office **Word** and **Excel**.

Another nice feature is an HDMI video output, which allows you to connect the T100 to a larger monitor (with an HDMI input port) for normal office use.

If you have an android, or compatible smart phone, the charger and cable used by the phone can also be used to charge the T100, which saves carrying around extra cables and chargers. The battery in the T100, when fully charge, has a useful running time of 11 – 12 hours. However, it does take an equal amount of time to recharge the battery.

As this is a full **Windows 8.1** based computer, **SURPAC** loads and runs without any problems. Just be careful though. If you are going to buy an equivalent computer (there are others on the market), make sure that the operating system is the full **Windows 8.1**, and not a truncated Windows operating system such as Windows CE.

When using the tablet without the keyboard, you do need an "on screen" keyboard for entering data. Fortunately, **Windows** has such a keyboard called **OSK.exe**. It is advisable to make a shortcut of this small application and put it on the desk top, for easy access. The full path for the on screen keyboard application is :-

C:\Windows\System32\OSK.exe

In my opinion, the T100 would make a very useful field computer, as it can be slipped into a jacket pocket and can be used for carrying out on the spot calculations. It can also be used in the office, attached to an HDMI compatible monitor, to carry out normal **SURPAC** computation and **CAD** work. It is not as fast as an Intel i5 or i7 based computer, but much more flexible.

This is by no means a promotion for this particular computer, there are other, similar ones on the market. I just wanted **SURPAC** Users to be aware that these types of computer, running **Windows 8.1**, are currently available. The price for the **T100** is in the region of R5,000.00.

(New) Grid Line comparisons : Field Data with Master Data

General Information

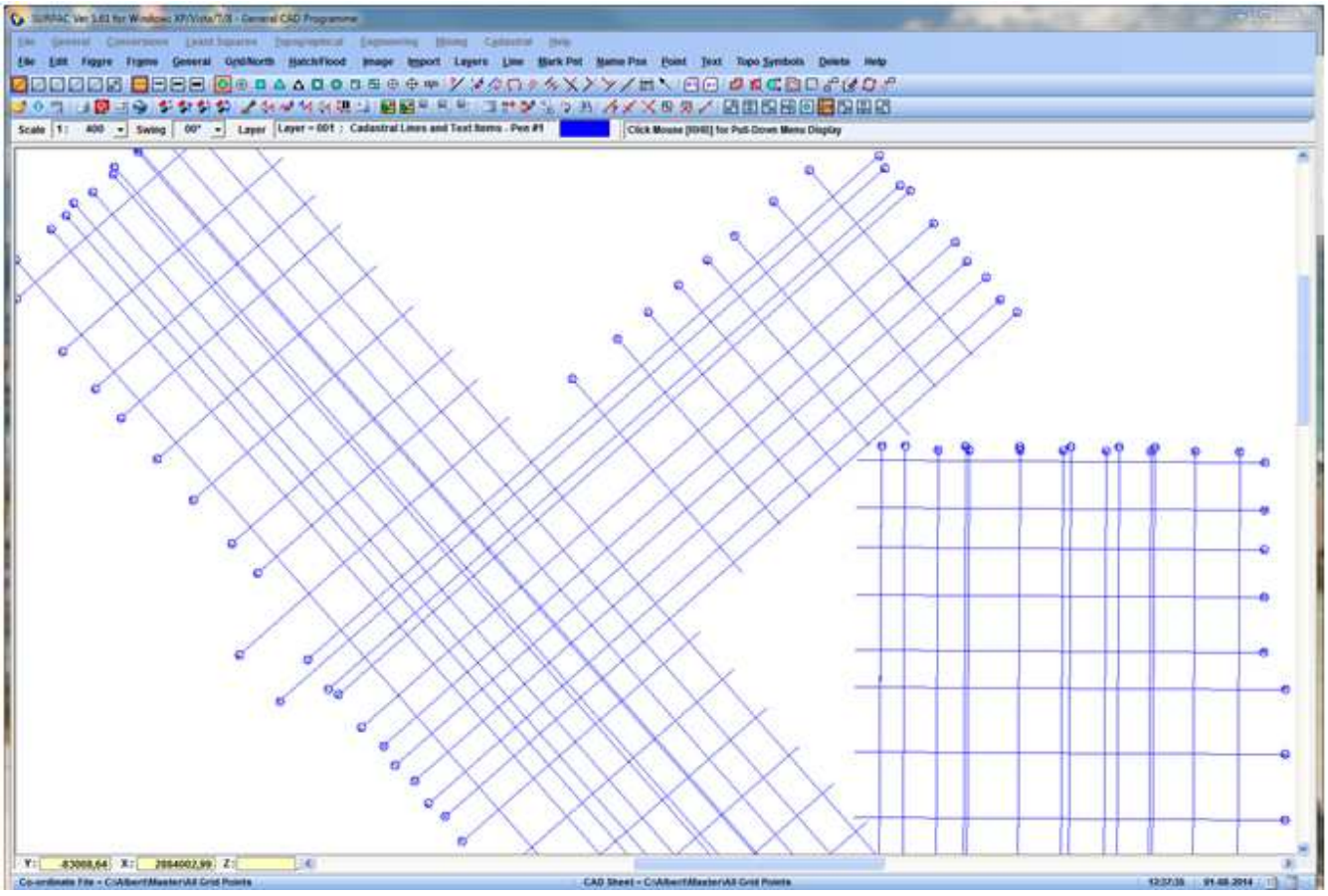
NB : *This new programme is listed under the Conversions main menu heading. You need to have the Conversions Module loaded in your License in order to use this programme.*

The Construction **Grid Lines** referred to here are the theoretical **Grid Lines** normally used to control earthworks and/or construction works for the erection of large buildings such as factory complexes or shopping mall complexes.

These theoretical Construction **Grid Lines** need to be transferred from the design plans, to the ground, normally under the auspices of a Surveyor. This can entail establishing on-site beacons at the **Grid Line** intersection points, beacons near to **Grid Line** terminals, beacons at an offset from a **Grid Line**, or all of the above.

Once these beacons have been placed, their accuracy, in comparison with the theoretical **Grid Lines** should be checked by means of a check Survey. These check Surveys need to be carried out to high accuracy in the field and the resulting observations and measurements should be adjusted using Least Squares routines.

What is then required is a routine that can rapidly and accurately compare the positions of the placed beacons (resulting from the check Surveys) against their theoretical values. This programme provides such a routine.



SURPAC General CAD programme showing a Construction Grid Line Layout

Programme Requirements

Two **SURPAC** Co-ordinate files are required for this programme, namely the "**Master**" file and the "**Field**" file..

The Master Co-ordinate file

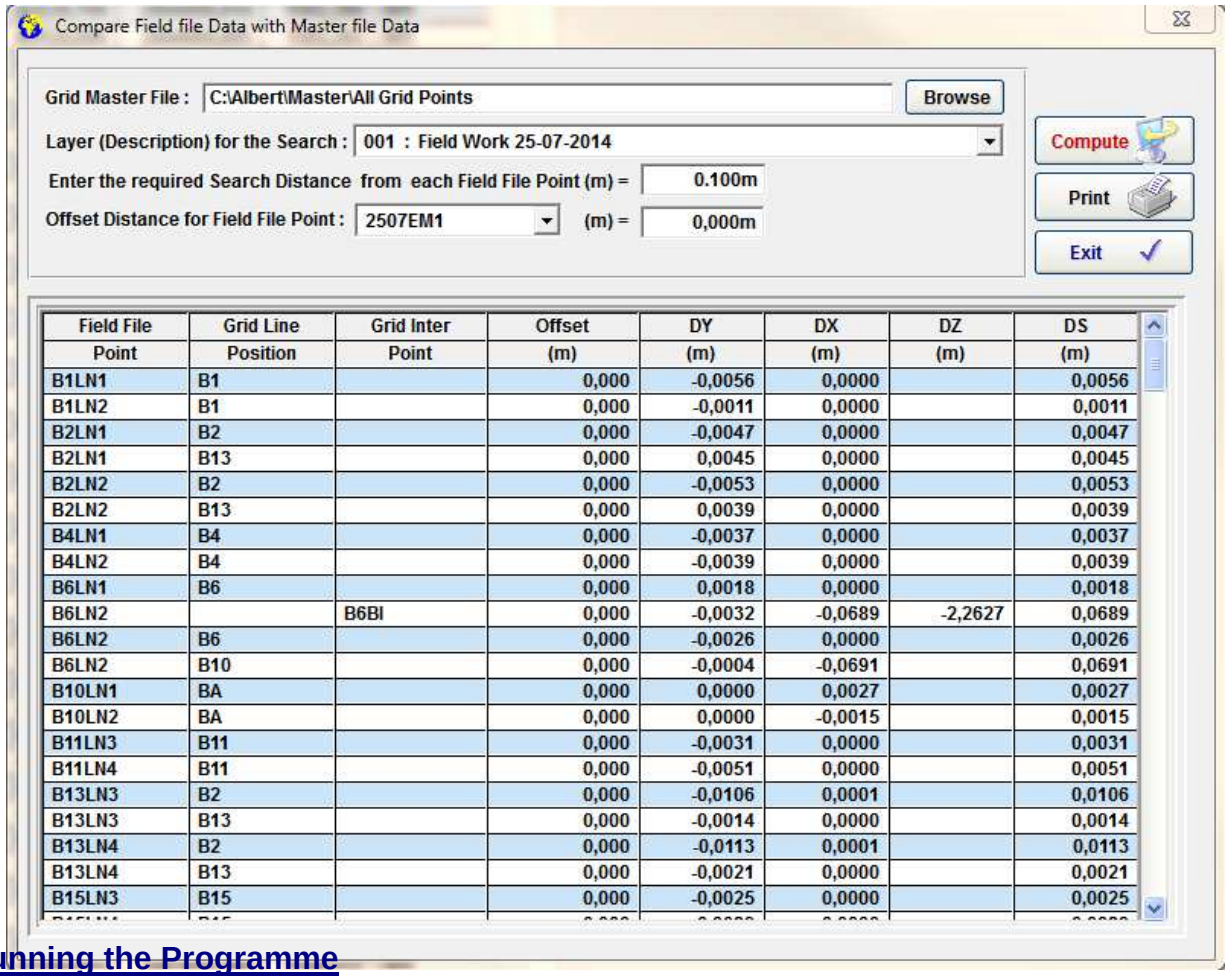
The first file, known as the "**Master**" file, contains all theoretical **Point** information. The **General CAD Sheet** for this file also consists of **Lines** and **Text** related to the Grid Line layout.

***NB** : It is important to note that **all** the **Line** and **Text** information for the **Grid Lines** must be in **Layer 001**.* The Sheet may contain any other Line and Text information on any of the other Layers, but Layer 001 is reserved to be used solely for the theoretical Construction **Grid Line** information.

In Layer 001, solid **Lines** must be constructed along each theoretical **Grid** Li**n**e, going from terminal to terminal. If required, these Lines may extend beyond the theoretical terminal limits. Each **Grid Line** then needs to be labelled (also in **Layer 001**), by means of adding the appropriate **Text** item at one, or both ends of the each **Grid Line**. Each **Grid Line Label** must be close to its corresponding **Line** terminal and should not be more than 1m (at true scale) from the terminal. The size, orientation and font of the Text Label are irrelevant. The **Text Label** itself can be any mix of alphanumeric characters, with a maximum length of eight characters.

The Field Co-ordinate file

The second file, Known as the "**Field**" file contains all filed check Survey data, made in a cyclic manner. The Co-ordinate file itself holds all beacon values resulting from the individual check Surveys. Each observation Cycle must be allocated a Layer (or Description), so that the cyclic information data are kept apart. This allows each check Survey to be analyzed individually. As the Engineering format of a **SURPAC** Co-ordinate file allows for up to 300 Layers, this means that up to 300 check Surveys can be held in one Co-ordinate file.


Compare Field file Data with Master file Data
Grid Master File : C:\Albert\Master\All Grid Points
Browse
Layer (Description) for the Search : 001 : Field Work 25-07-2014
Enter the required Search Distance from each Field File Point (m) = 0.100m
Offset Distance for Field File Point : 2507EM1
(m) = 0,000m
Compute
Print
Exit

Field File Point	Grid Line Position	Grid Inter Point	Offset (m)	DY (m)	DX (m)	DZ (m)	DS (m)
B1LN1	B1		0,000	-0,0056	0,0000		0,0056
B1LN2	B1		0,000	-0,0011	0,0000		0,0011
B2LN1	B2		0,000	-0,0047	0,0000		0,0047
B2LN1	B13		0,000	0,0045	0,0000		0,0045
B2LN2	B2		0,000	-0,0053	0,0000		0,0053
B2LN2	B13		0,000	0,0039	0,0000		0,0039
B4LN1	B4		0,000	-0,0037	0,0000		0,0037
B4LN2	B4		0,000	-0,0039	0,0000		0,0039
B6LN1	B6		0,000	0,0018	0,0000		0,0018
B6LN2		B6BI	0,000	-0,0032	-0,0689	-2,2627	0,0689
B6LN2	B6		0,000	-0,0026	0,0000		0,0026
B6LN2	B10		0,000	-0,0004	-0,0691		0,0691
B10LN1	BA		0,000	0,0000	0,0027		0,0027
B10LN2	BA		0,000	0,0000	-0,0015		0,0015
B11LN3	B11		0,000	-0,0031	0,0000		0,0031
B11LN4	B11		0,000	-0,0051	0,0000		0,0051
B13LN3	B2		0,000	-0,0106	0,0001		0,0106
B13LN3	B13		0,000	-0,0014	0,0000		0,0014
B13LN4	B2		0,000	-0,0113	0,0001		0,0113
B13LN4	B13		0,000	-0,0021	0,0000		0,0021
B15LN3	B15		0,000	-0,0025	0,0000		0,0025

Running the Programme

The **Field** file must be loaded as the current Co-ordinate file then, from the **Conversions** menu heading, select the menu item **Grid Line comparisons : Field Data with Master Data**.

1. Click on the [**Browse**] button to select the required **Master** file. If the current **Field** file has already been used in conjunction with a **Master** file, the previously used **Master** file will be shown automatically.

2. Click on the down arrow next to the **Layer (Description) for the Search** and select the required **Field** file **Layer** to be used for the search and comparison. It is a good idea, as in the example above, to label each **Layer** in the **Field** file according to the date of the check Survey.

3. Once a **Layer** has been selected, the above form will display all the surveyed beacons in that **Layer**, and allow you to enter any **Offset** distances that might have been used for any of those surveyed beacons.

4. Finally, set the required **Search Distance** to be used from each of the **Field** file beacons. The default value is set as 0.100m.

5. Once all the required setting have been made, Click the [**Compute**] button. The programme will then list all found measurements between the **Field** file Points/Beacons and the **Master** file Theoretical **Grid Lines/Intersections**, that are within the specified Search distance.

Some **Field** file Beacons can be listed up to three times. If the Beacon is close to a Theoretical **Grid Line** Intersection, its distances from both **Grid Lines**, as well as its distance from the **Grid Line intersection** will be listed separately.

Finally, by Clicking the [**Print**] button the obtained results can be printed using the **SURPAC** data print format. From this display, the results may be printed to a physical Printer, the **SURPAC VPG** file, the Windows **Clipboard**, an **ASCII** file or a ***Microsoft* Excel** file.

My thanks to Albert Coetzee, Land Surveyor, for originally suggesting this feature.

SURPAC User's Manual Book 3 – SURPAC Google Earth functions

I have collated all the currently available **SURPAC Google Earth** functions into the **SURPAC User Manual #3**. This manual is in **PDF** format and may be downloaded as follows :-

Copy the **URL** below and Paste it into your web browser's URL window.

www.surpac.co.za/Demo%20Install/Download%20Demo.htm

Scroll to the bottom of the displayed web page and click on the image to the left of the "**Download SURPAC User Manual Book 3 – for Google Earth functions**". There is no charge for this download. If you don't already have **SURPAC User Manuals 1** and **2** :-

SURPAC User Manual – Book 1 covers all the basic **SURPAC** functions plus the programmes in the "**Lite**" Module. This book (written by **R. Oelofse**) costs **R150.00** to purchase, in **PDF** format.

SURPAC User Manual – Book 2 covers all the **SURPAC Cadastral CAD** functions in both the **Cadastral** Modules. This book (written by **M. Matthews**) costs **R220.00** to purchase, in **PDF** format.

General Modifications

Pretoria Local System for WG29 – Previously, this function was only available for converting from the Local System to Lo 29 (Clarke 1880 (Modified). Conversions can now carried out from the Local system to WG 29 (WGS 1984).

Importing Google Earth Placemarks – There are various ways by which a Point **Name** can be held in a **KML** Placemark. Prior to this Upgrade, **SURPAC** could only locate the Point **Name** if it was stored in a particular location. This routine has now been expanded so as to locate the Point **Name,** regardless of the storage format.

Storing and Retrieving data from "My Stations" files – Users may now specify the path where the "**My Stations**" files are to be located. One of the files is for storing "**Lo**" Stations and the other for storing "**WG**" stations.

To use this option, when in the **Co-ordinate File Editing** programme, click on the [**File Options**] button on the left of the form. You will see a new option on the displayed options form that allows you to select the required path.

When disconnected from the network, **SURPAC** will automatically re-set the location to the "C:\Surpac Software" folder. When re-connected to the network, **SURPAC** will re-set the location to the network drive previously selected.

Storing My Nearest Stations data - The file's [Y, X, Z] constants were being ignored. This has now been fixed.

General Plan CAD Programme – The number of General Plan outside **Figure Points** has been increased to A99, B99,....., Z99.

General CAD Programme – There was a problem when importing **Google Earth** (**KML**) **Polygons**. This has now been resolved.

The **Hatch colours** Imported from **DXF** and **DWG** files has been improved, so as to more closely match the original **DXF**/**DWG** colours.

The "**Locate Point**" function was not working correctly when the Co-ordinate file was set in the **Engineering** format. This has now been corrected.

Locate and Mean Point Groups in a file – The available comparison options now also include the facility to include the **Z** (**Height**) values in the comparisons.

General Observation Files -: There was a problem when **Meaning Horizontal Angles** in an Observation file. This has now been fixed.

Namibian Bessel 1841 System -: This system has now been expanded to include the "Lo 22/25º" system.

Using the CloudCompare 3D application with SURPAC

CloudCompare is a powerful open-source point cloud processing software that has been developed by Daniel Girardeau-Montaut for a variety of uses, including topographical surface analysis and comparison for Engineering Surveyors, Mine Surveyors, Civil Engineers and Architects. It is an open source 3D point cloud and mesh processing software project. It is most powerful in processing and comparing dense point cloud data, visualizing data and data analysis.

CloudCompare makes use of the **OpenGL 3D** Software Development Kit, which provides real time rotation in the 3 axes, zooming and panning of a visualized model.

Linking **CloudCompare** with **SURPAC** Software provides a seamless and powerful tool for **SURPAC** Users. It not only provides real time model visualization, but also enables volume and surface area calculations, contour visualization and image file outputs.

CloudCompare can handle Point Clouds in excess of 50 million points. However, the processing of data is memory intensive and for smooth operation of the software the following minimum requirements are advised :-

1. ***Installed Memory (RAM) of 8Gb***
2. ***A fast middle class 3D Graphics Card such as an AMD Radeon 6770M or GeForce GT555M, or similar***.

Creating CloudCompare files in SURPAC

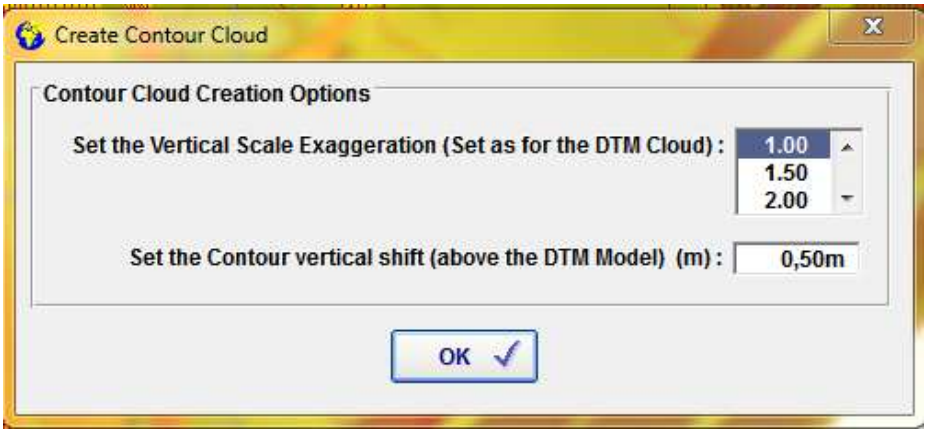
To create **CloudCompare** (Point Cloud) files in **SURPAC**, the **Topographical** Module must be installed and be active.

The **Contour Creation/Plotting CAD** programme (found under the **Topographical** main menu heading) allows for the creation and export of a pseudo-DXF Contour file which can be read and displayed by CloudCompare.

The **Digital Terrain Modelling** programme (also found under the **Topographical** main menu heading) allows for the creation and export of Point Cloud ASCII (*.asc) format files for the **Surface** (Figural) **DTM** and the **Base DTM**. When sending these Point Cloud files, they may be displayed singularly, both together or both together with the corresponding Contour file.

Creating a Contour file for display in CloudCompare

Once the creation of the Contours in the **SURPAC Contour Creation/Plotting CAD** programme has been completed, using the normal techniques, these can be exported to **CloudCompare** in a pseudo-DXF file format. To do this, select the menu item ***File/Create the Contour Point Cloud File***



Option form for creating a Contour Point Cloud

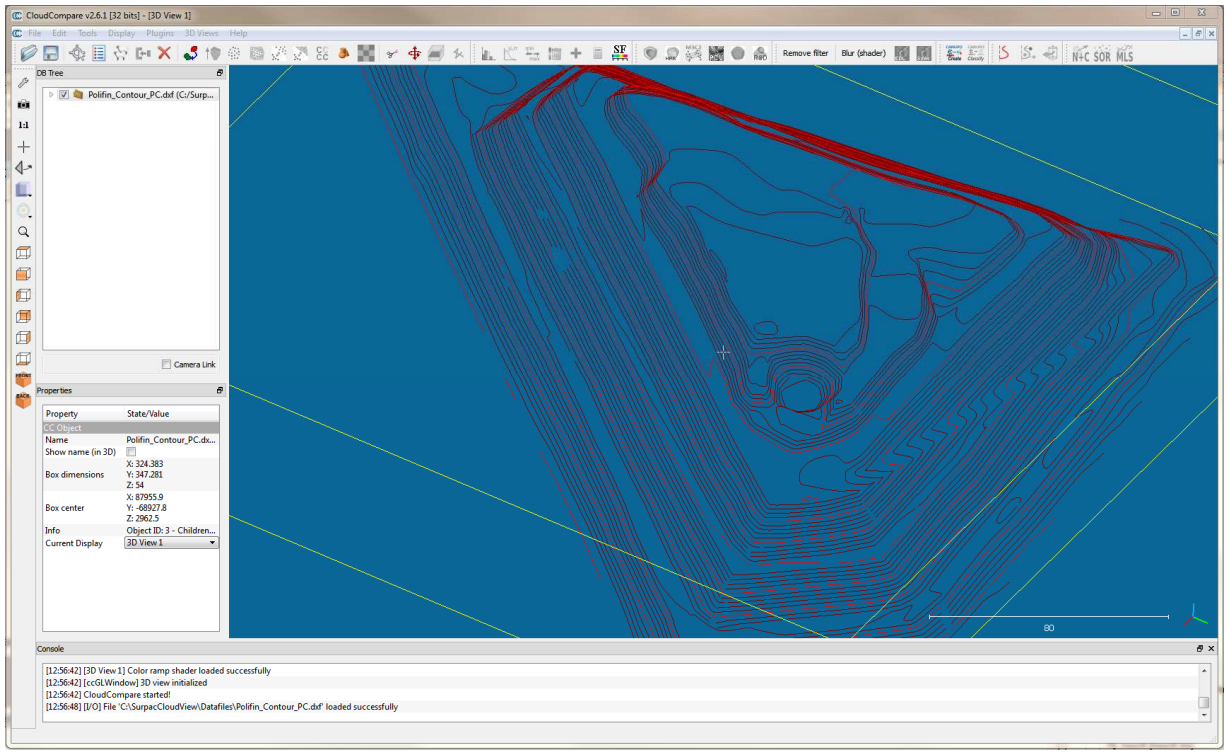
The above option form will be displayed. The **Vertical Scale Exaggeration** value allows the display of the contours to be exaggerated in the Z axis. This often helps the visualization for the surveyed area. It is important to set the same **Vertical Exaggeration** for both the Contour and DTM Point Clouds. If the two values are set differently, the contours overlaying the DTM will not appear to be correct. This can be changed once **CloudCompare** is running, but it is advisable to set the values correctly before displaying the data.

The **Contour Vertical Shift** is sometimes required to ensure that the contours are visible above a DTM Surface. If no DTM Surface is to be displayed along with the Contours, then the shift can be left at 0.00. By default, the programme shifts the contours upwards by one contour interval.

The generation of the Contour Point Cloud file should only take a few seconds. Once complete, you can then select the menu item :-

File/Display the Contour Point Cloud File

This will instruct **SURPAC** to load and run the **CloudCompare** software and to open the **Contour** Point Cloud.



Display of a SURPAC Contour Point Cloud (pseudo-DXF) in CloudCompare

When navigating around the display in **CloudCompare**, it is important to note that the Mouse button functions are different from those used in **SURPAC** and **Google Earth**.

The **Mouse** button functions in **CloudCompare** are :-

Button 1 (Left hand button) : Used for **Rotating** the model about the 3 axes
Button 2 (Middle button) : The scroll wheel is used to **Zoom** the model (as is used in **SURPAC**)
Button 3 (right hand button) : Used to **Pan** about the model

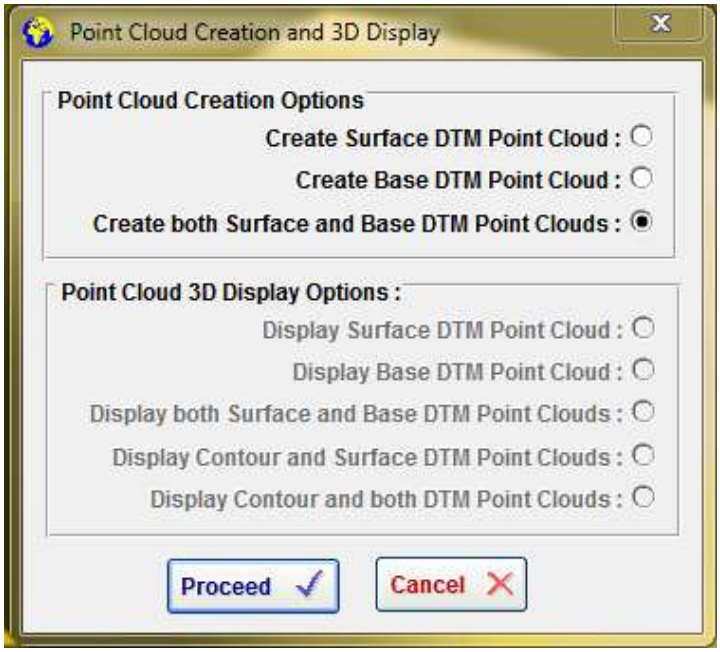
Creating a DTM Point Cloud files for display in CloudCompare

Run the **SURPAC** programme ***Topographical/Digital Terrain Modelling***.

Proceed to generate the **Surface** and **Base** (if applicable) **DTM**s in the normal manner. When selecting the Grid Interval, the default value of twice the minimum interval allowable seems to work well when exporting the Point Cloud files to **CloudCompare**.

To create the Point Cloud files, click on the Point Cloud Options button at the bottom left hand site of the **DTM** display.

The following form will be displayed :-

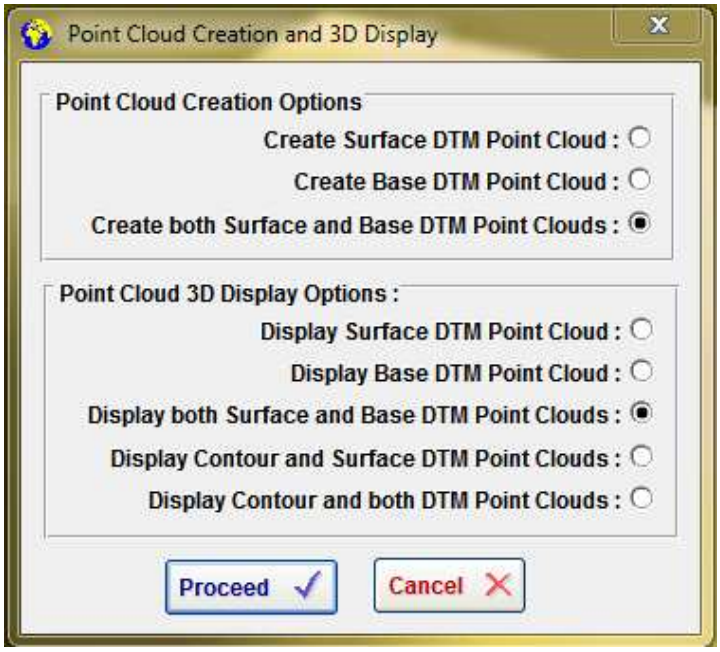

Point Cloud Creation and 3D Display
Point Cloud Creation Options
Create Surface DTM Point Cloud :
Create Base DTM Point Cloud :
Create both Surface and Base DTM Point Clouds :
Point Cloud 3D Display Options :
Display Surface DTM Point Cloud :
Display Base DTM Point Cloud :
Display both Surface and Base DTM Point Clouds :
Display Contour and Surface DTM Point Clouds :
Display Contour and both DTM Point Clouds :
Proceed
Cancel

If both the **Surface** and **Base DTM**s exist, select the third Point Cloud creation option. If only the Surface **DTM** exists, select the first option.

The time taken to create the Point Cloud file(s) depends on the size of the area surveyed and the size of the selected grid interval and the processing speed of the computer. Generally, the file creation takes from a few seconds to a few minutes.

Once the files have been created, again click on the Point Cloud Options button.

The form will again be displayed, as shown below :-

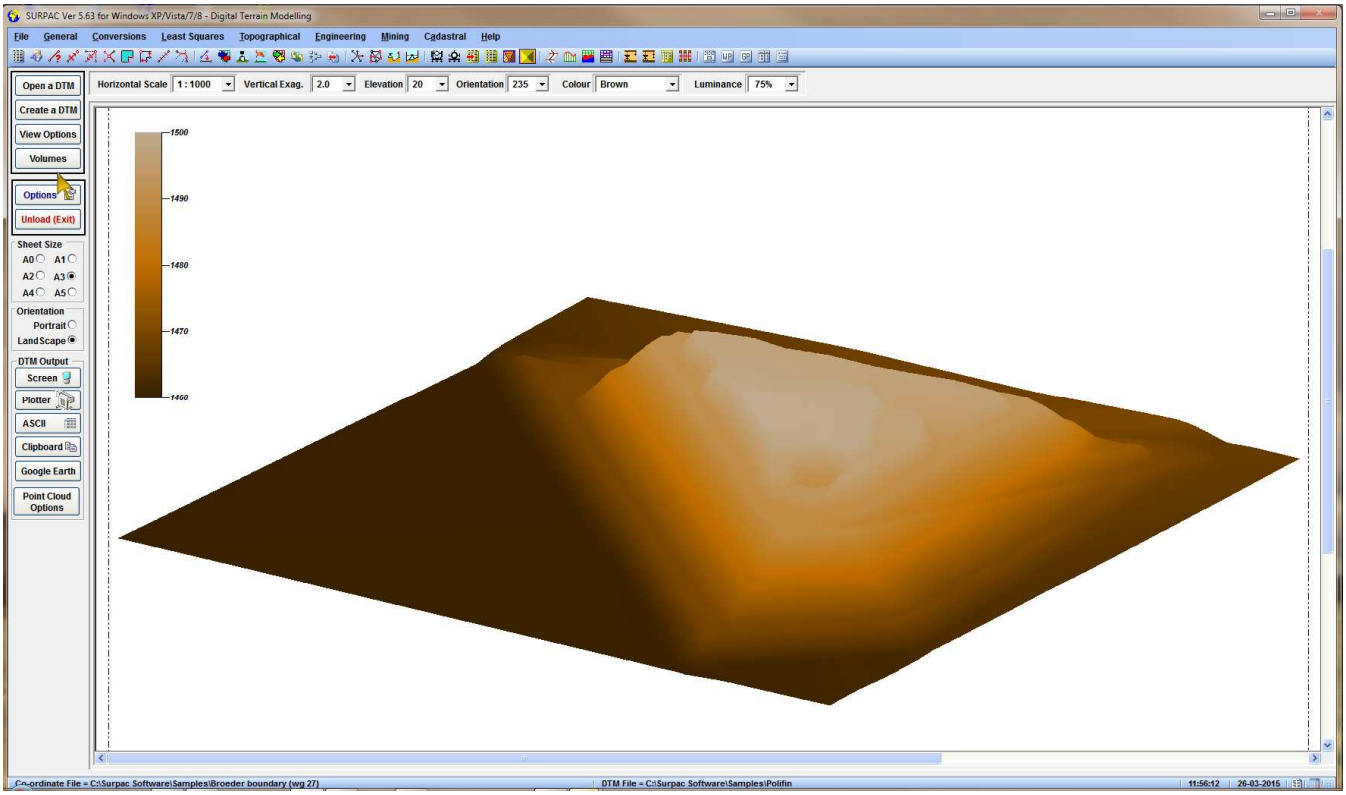

Point Cloud Creation and 3D Display
Point Cloud Creation Options
Create Surface DTM Point Cloud :
Create Base DTM Point Cloud :
Create both Surface and Base DTM Point Clouds :
Point Cloud 3D Display Options :
Display Surface DTM Point Cloud :
Display Base DTM Point Cloud :
Display both Surface and Base DTM Point Clouds :
Display Contour and Surface DTM Point Clouds :
Display Contour and both DTM Point Clouds :
Proceed
Cancel

The available options now allow for the display of the Point Cloud(s), using **CloudCompare**.

The displayed options are self-explanatory. Each **DTM** can be displayed separately, or both at the same time. If the Contour Point Cloud exists (see above), then the **DTM**(s) and the **Contours** can be displayed simultaneously.

Also, you should bear in mind that **CloudCompare** is able to display multiple screens simultaneously and that files can be dragged and dropped onto the display area to create multiple displays of **Contours** and **DTM**s from different viewpoints.

To start with, take a typical example of **Surface** and **Base DTM**s, created for the purpose of visualization and volume calculation. In **SURPAC**, the **Surface DTM** looks as follows :-



Displaying the Surface DTM in SURPAC Software

When creating the Point Cloud files in **SURPAC**, it is important to remember that the **Vertical Exaggeration**, **Colour** and **Luminance** as used for the **SURPAC** display will be transferred to the **CloudCompare** display. *Further, if **Contours** are also to be displayed simultaneously with the **DTM**(s), then the **Vertical Exaggeration** used for both Contours and **DTM** Point Clouds should be the same for a correct display.*

Storing the SURPAC created Point Cloud files for display in CloudCompare

When installing **SURPAC** (or the Version 5.63 Upgrade), the application will create folders for storing both the **CloudCompare** application files and the **SURPAC** created Point Cloud and pseudo-DXF contour files. This data storage folder is called :-

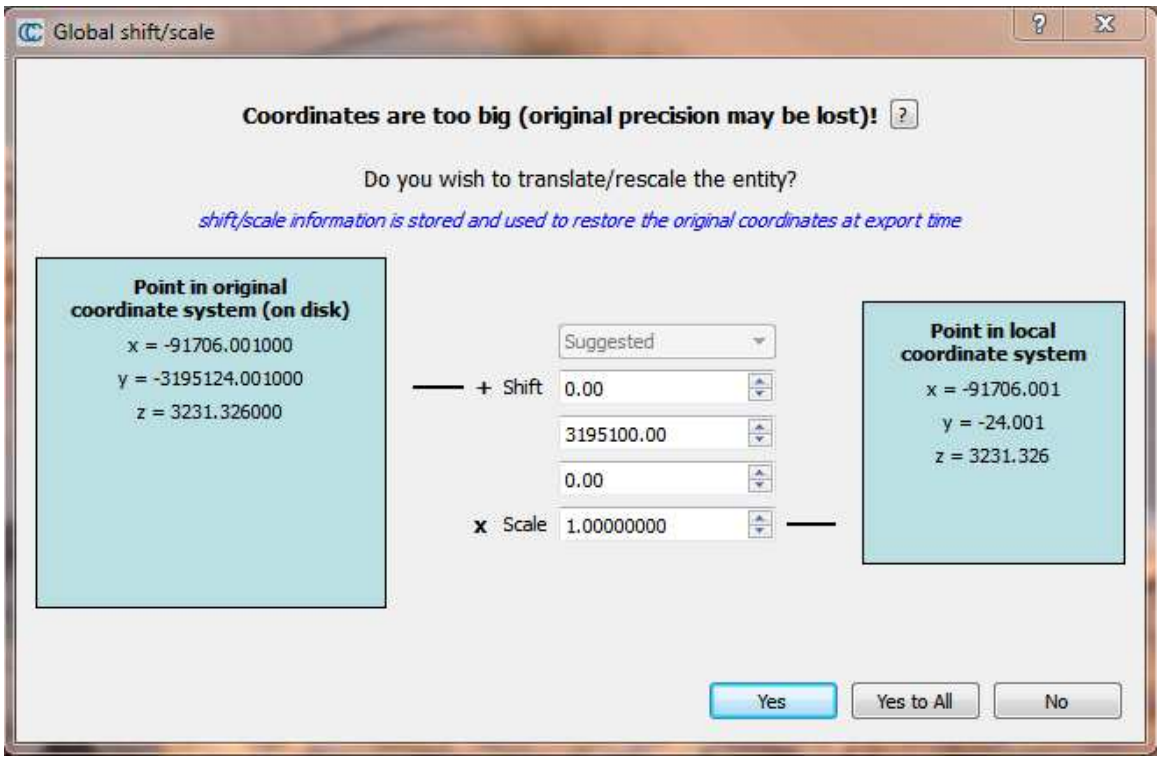
C:\Surpac_CC

All Point Cloud files created by **SURPAC** will be stored in this folder. **SURPAC** created files will be given the following names :-

DTM Surface Point Cloud file …... ***File_Name_Surface_PC.asc***
DTM Base Point Cloud file ……... ***File_Name_Base_PC.asc***
Contour pseudo-DXF file …….. ***File_Name_Contour_PC.dxf***

Note that if the ***File Name*** has any spaces included, **SURPAC** will automatically convert these to _ (underscore), as names with spaces cannot be exported to **CloudCompare**.

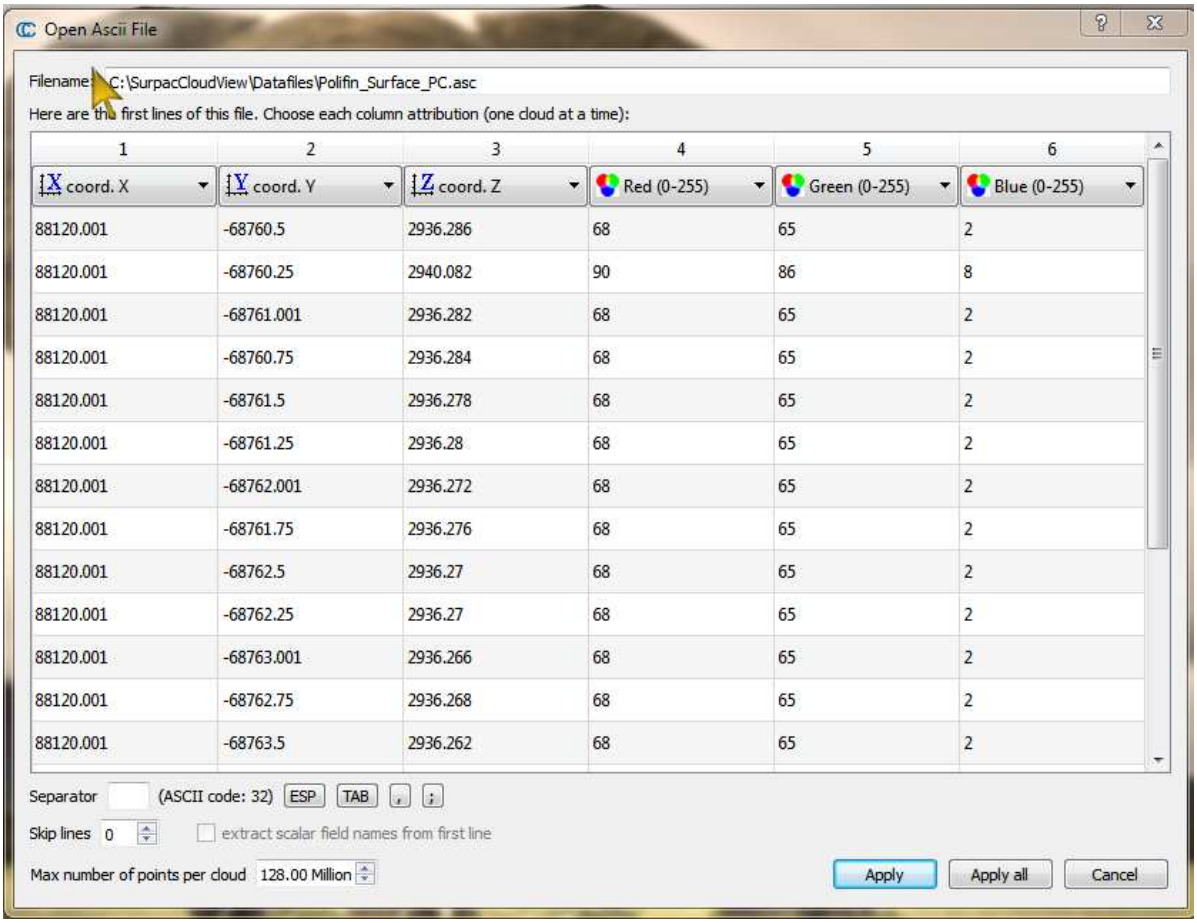
If the Y, X (or E, N) values used by **SURPAC** are too large, **CloudCompare** will suggest an origin, or global, shift for these values in order to prevent any accuracy loss. In this case, just accept the suggested shifts unless you have any particular reason to override these with your own shift values.



CloudCompare automatic co-ordinate origin (Global) shifts to prevent accuracy loss

This type of shift requirement is typical for surveys in the Southern African "**Lo**" or "**WG**" systems where no constant has been applied to the X values (*interpreted by **CloudCompare** as being Y values*). This is also true for surveys carried out in the **UTM** system in the Southern Hemisphere.

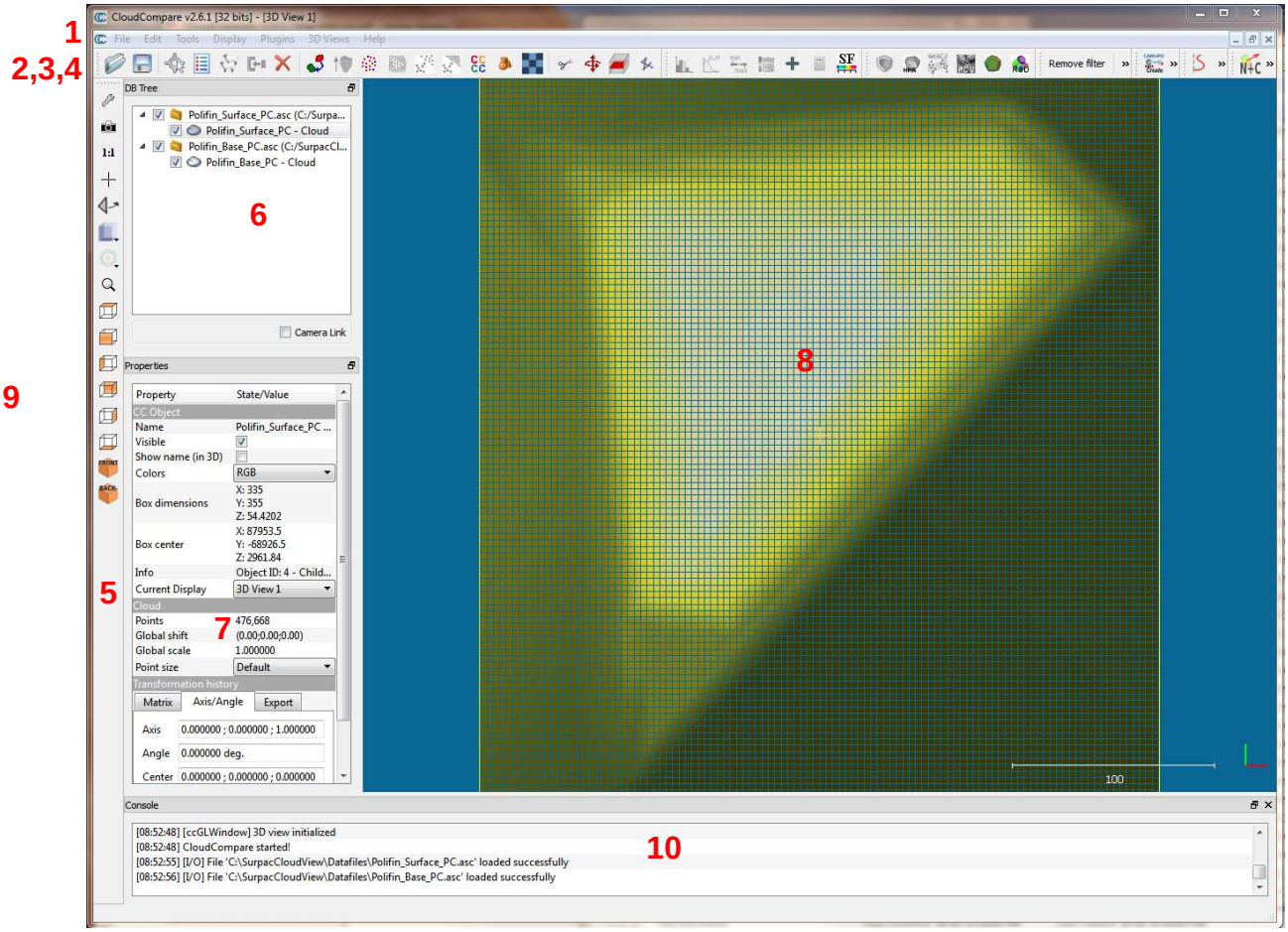
CloudCompare will then display its interpretation of the **SURPAC** created **ASCII Point Cloud** file. This interpretation is correct and does not any user **modification**. The first 3 columns are the [**X**, **Y**, **Z**] point data and the last 3 columns are the **Red**, **Green**, **Blue** colour components of each point in the cloud. *Please note that as **CloudCompare** was originally designed for Northern Hemisphere countries, the **X**, **Y** values represent the **Y**, **X** values for Southern African countries.*



The **Red Green Blue** components are those inherited from the **SURPAC DTM** display. They depend on the **Colour** and **Luminance** as set in **SURPAC**.

Also note, that if a **Vertical Exaggeration** has been applied in **SURPAC**, then the height values shown will be the actual height values multiplied by the **Vertical Exaggeration** applied.

To proceed to the file display, click the [**Apply All**] button. **CloudCompare** will then load and display the **DTM**(s) requested, which in the example looks like this :-



Initial display of a SURPAC DTM in CloudCompare, showing layout descriptions

The numbers in red above are described as :-

1. **Menus**

- File (open, save, quit, etc.)
- Edit (edit selected entities and their features - colours, normals, scalar fields, etc.)
- Tools (segmentation, registration, projection, etc.)
- Display (display-related options)
- Plugins (loaded plugins)
- 3D Views (3D views management)
- Help (about, help, etc.)

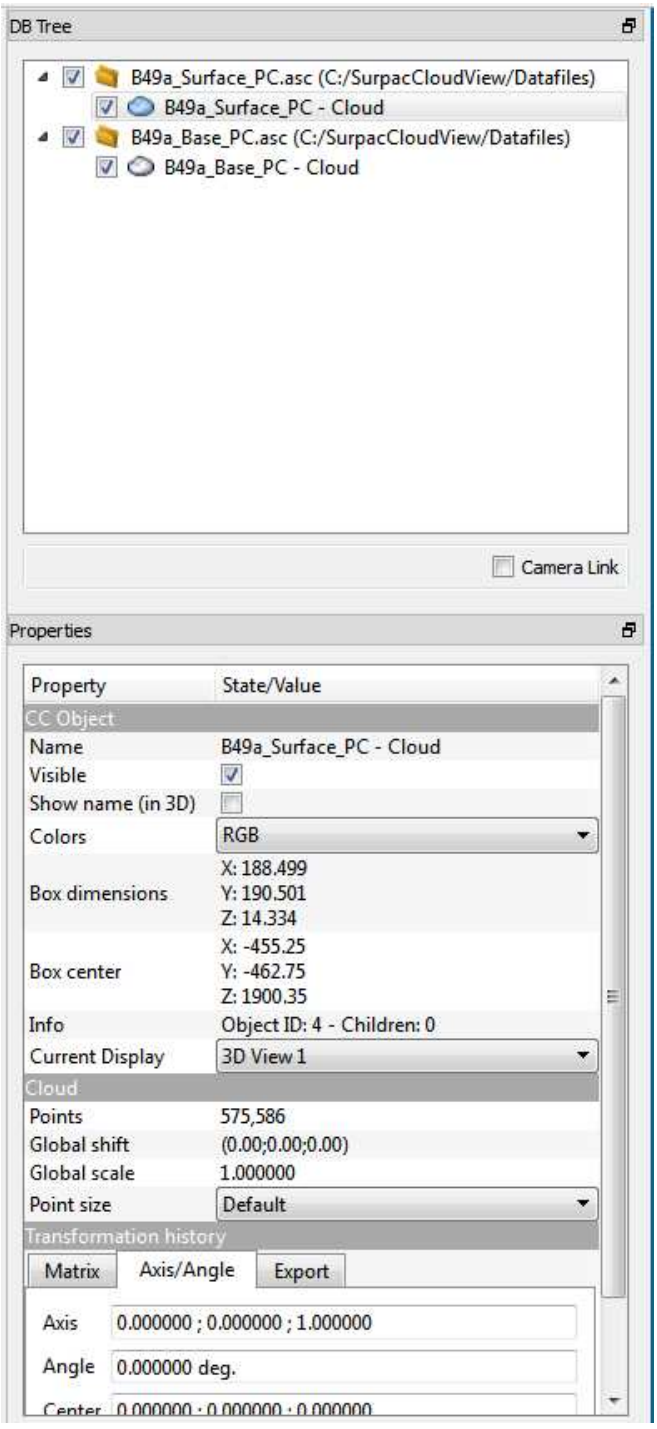
2 - 4. **Toolbars**

- Main (quick access to editing and processing tools: open/save, point picking, clone, etc.)
- Scalar fields (quick access to scalar fields related tools)
- Plugins (quick access to currently loaded plugins - *standard* and *OpenGL shaders*)

5. **View toolbar** (quick access to display-related tools)

6. **Database** tree (for selection and activation of entities and their features)
7. **Properties** view (information on selected entity)
8. **Default 3D** view
9. **Another 3D** view (created with *3D Views* > *New*)
10. **Console**

Before you carry out any editing on the 3D model, or use it to compute volumes, you must first Click on the relevant Point Cloud entity in the **Database tree**. This action will populate the **Properties** view and activate the relevant **Menu** items.



From a **SURPAC** user's point of view there are two main objectives for making use of the **CloudCompare** application. The first is for enabling real time visualization of a 3D surface model. This includes the ability to rotate, zoom and scan the model and to simultaneously view different aspects of the model in different windows. The second objective is to compute volumes to use as a check for the volumes created in **SURPAC** for the same model.

Options for viewing a 3D Model

There are various ways of displaying a 3D model in **CloudCompare**. Here we will describe two of these ways. Each method has its advantages in relation to speed and correct visualization of the model.

Method #1 - This method is the simplest and fastest, but does not always provide the clearest or best defined models.

Once the imported **DTM** model is displayed, as shown on the previous page, move the cursor to the top left corner of the display screen. The caption **default point size - · +** will appear. Click on the **+** sign 2 or 3 time until the gaps in the model grid appear to be filled by the enlarged points.

Although quick and easy, this method ails to produce a model with the same detail and accuracy as the other 2 methods. The display can be reverted back to its origin form by clicking on the **–** sign 2 or 3 times.

Method #2 - This method is a bit more complex, but still fairly straight forward, and produces far better models. Importantly, it also produces the necessary **Mesh** model (***Delaunay 2.5D***) required for volume calculations.

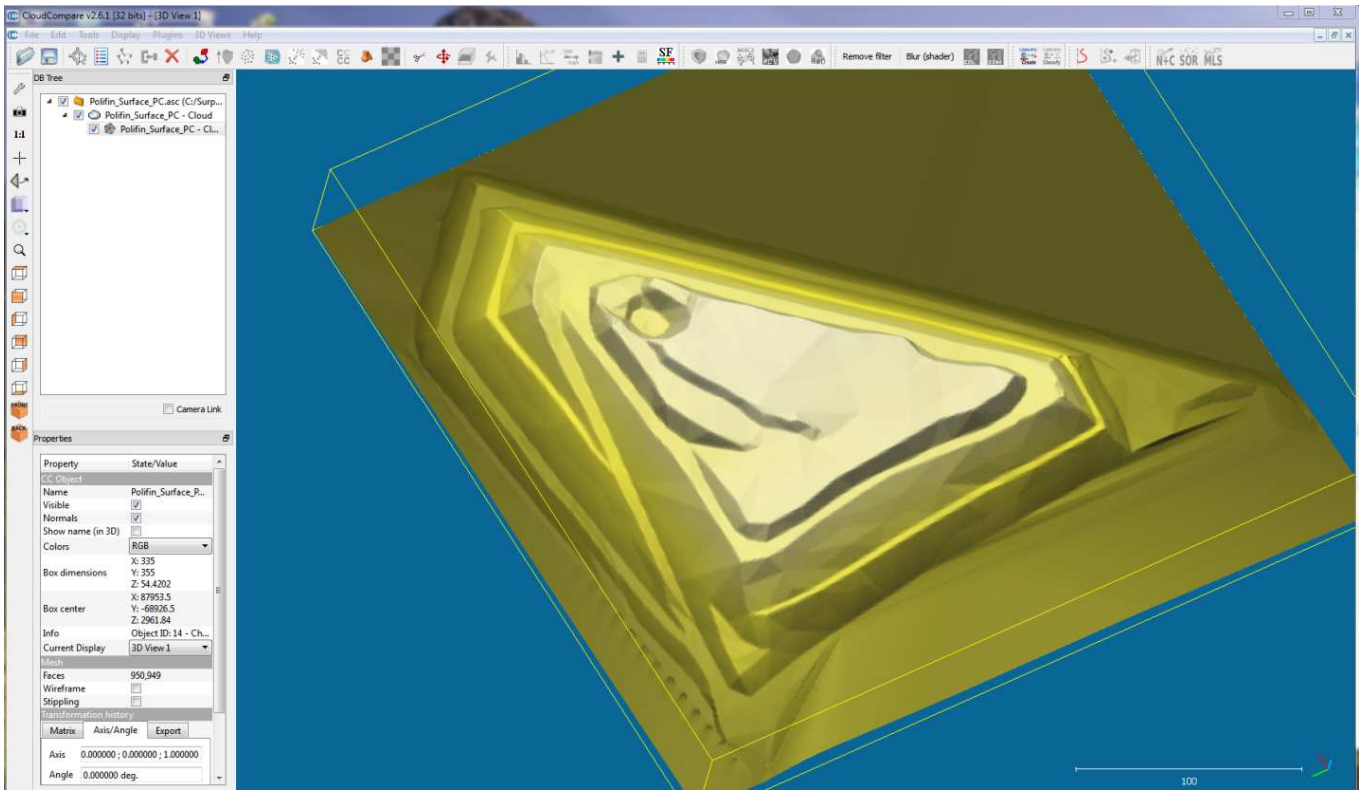
To apply this method, first highlight the **Surface DTM** model (i.e. its Point Cloud) in the **Database tree**, then follow the menu path :-

Edit/Mesh/Delaunay 2,5D (XY plane)

A small form will appear requesting the required maximum edge length for the triangulation. For a standard **SURPAC DTM** with both surface and Base **DTM**s, the default value of 0.00000 can be accepted. However, if the **DTM** is a Surface model only, and is of irregular shape, you may need to apply a maximum triangle edge length to prevent the programme extrapolating beyond the surveyed area. When ready, press the [**OK**] button.

The triangulation (mesh) process should only take a few seconds. Once complete go to the **Properties** display at the bottom left of the screen, and check (Click) the box called **Normals**.

The resulting model is much better defined than that created under **Option #1**, with sharper edges and colourization defining topographical features such as slopes, peaks and valleys.



A SURPAC Surface DTM displayed in CloudCompare using Delaunay Mesh Normals

Repeat the above exercise for the **Base DTM** (if applicable and if **Volumes** are required) so that Mesh models for both surfaces are computed.

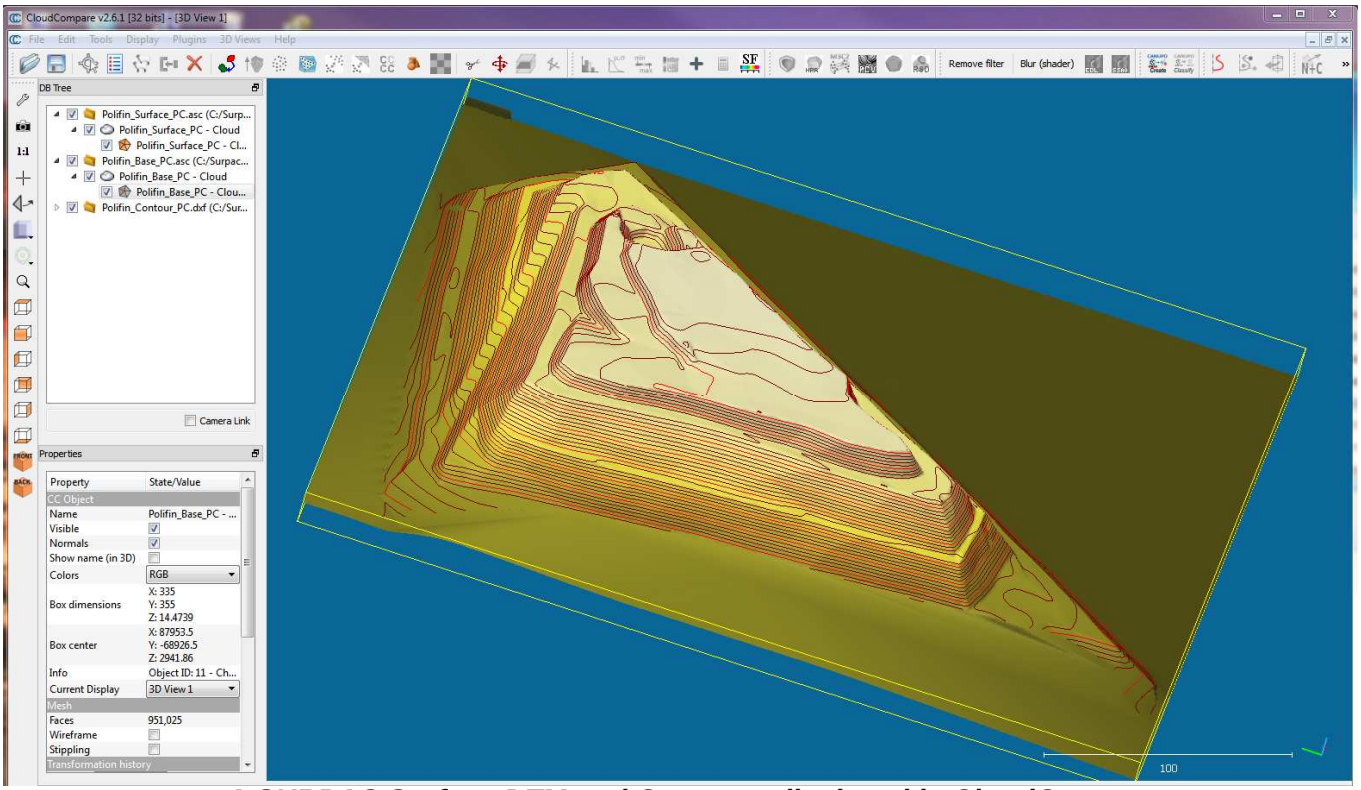
As the **Surface DTM** will normally hide the **Base DTM** (unless the survey is of an excavation), the **Base DTM** can be viewed on its own by clicking on the check box to the left of the name of the **Surface DTM**. Checking this box again will make the **Surface DTM** visible again.

Adding Contours to the Surface DTM display in CloudCompare

If a pseudo-DXF **Contour** file has been created in the **Contour Creation/Plotting CAD** programme, these Contours can be displayed simultaneously with the **Surface DTM** model.

NB : *When exporting **DTM Point Cloud** models from **SURPAC** to **CloudCompare**, the option exists to export the **Contours** at the same time as the model, presuming the **Contour** pseudo-DXF for the current file exists*.

First Click the ***File/Open*** menu item and then select the required **Contour** file. Depending on the area size and contour interval used, this loading and display will take a few seconds. For a correct display, the co-ordinate system and constants used for the Contour file must be the same as for the DTM files, and the **Vertical Exaggeration** for both the **Contour** file and the **DTM** file(s) must be the same.

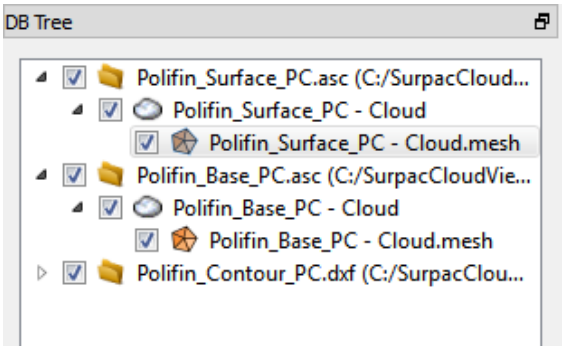


A SURPAC Surface DTM and Contours displayed in CloudCompare

Computing Volumes from SURPAC DTMs in CloudCompare

A useful benefit from creating **Delaunay Mesh** files for the **Surface** and **Base DTM**s, is the ability to compute the **Volume** between these two surfaces.

This is done in two parts. First, the **Volume** for the **Surface DTM** model is calculated. This volume is determined from an X,Y plane set at the lowest height of the model. To do this, make sure that the highlighted entity in the **Database tree** is the Mesh file of the **Surface DTM**.



The figure on the left shows the highlighted (selected) entity as the **Mesh** file for the file ***Polyfin_Surface_PC***.

A **Volume** for this model can now be calculated using the **CloudCompare** function.

Now follow the menu path :-

Edit/Mesh/Measure Volume

The result of the volume calculation will be displayed in the **Console** at the bottom of the screen.

If a message appears in red in the **Console**, stating that the Mesh model “has holes”, you will need to check (in **SURPAC**) that the **DTM** does not in fact have any missing triangles. If you are satisfied that there are none, then ignore this message. In the **Console** a message such as :-

V = 1.62421e+06 (cube units) (for the Surface DTM)

Will be displayed.

Now repeat this action, this time highlighting and using the **Base DTM** file. Once again, you will get a Console message, such as :-

V = 298440 (cube units) (for the Base DTM)

To determine the net volume between the two surfaces, subtract the **Base DTM** volume from the **Surface DTM** volume (or the other way around for an excavation survey) and finally, divide the result by the **Vertical Exaggeration**, e.g.

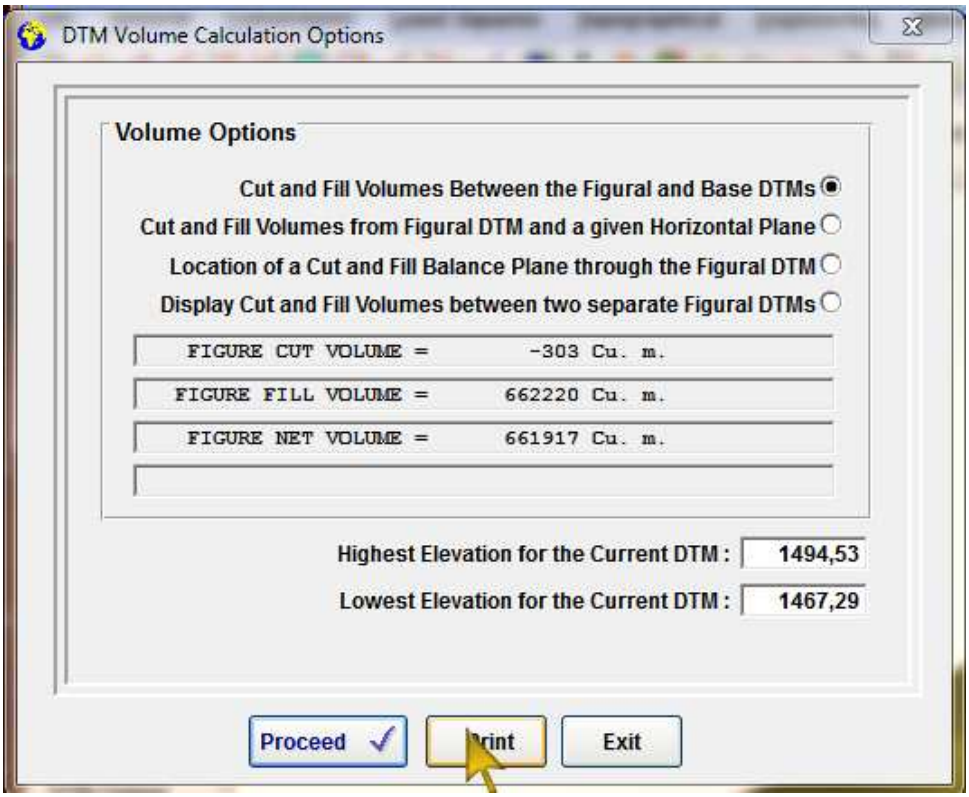
Net Volume = (1,624,210-298,440)/2 = 662,885 m³ (survey unit for this example is metres).
*This result presumes that both **DTM**s have the same **minimum Height** value, which is used as the base height for both Volume calculations.*

Comparing the CloudCompare Volume with the SURPAC Volume

The same volume can be calculated in **SURPAC**, albeit following simpler steps. In the **Digital Terrain Modelling** programme, click on the [**Volumes**] button at the left of the display. On the Volume Options form that will be shown, select the item :-

Cut and Fill Volumes Between the Figural and Base DTMs

and then click the [**Proceed**] button.


DTM Volume Calculation Options
Volume Options
Cut and Fill Volumes Between the Figural and Base DTMs
Cut and Fill Volumes from Figural DTM and a given Horizontal Plane
Location of a Cut and Fill Balance Plane through the Figural DTM
Display Cut and Fill Volumes between two separate Figural DTMs
FIGURE CUT VOLUME = -303 Cu. m.
FIGURE FILL VOLUME = 662220 Cu. m.
FIGURE NET VOLUME = 661917 Cu. m.
Highest Elevation for the Current DTM : 1494,53
Lowest Elevation for the Current DTM : 1467,29
Proceed
Print
Exit

The resultant net **Volume** from **SURPAC** is **661,917 m³**. Hence the difference in net **Volume** between **SURPAC** and **CloudCompare** for this survey is:-

661,917 – 662,885 = -968 m³ (or 0.15%).

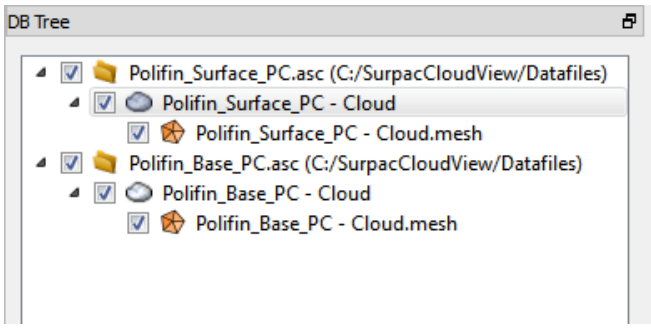
NB : ***Warning**! The **CloudCompare Volume** calculation results must be treated with caution. For stockpile measurements for example, the **Surface** and **Base DTM**s must have the same **minimum height** value, otherwise the two volumes will not refer to the same base level*

Creating Contours in CloudCompare

Another useful function in **CloudCompare** is the creation of **Contours**. This feature can be used either for comparison with the **SURPAC** created **Contours**, or for generating new **Contours** from a **Point Cloud** file that has not been crearted in **SURPAC**.

Using the same example as above, follow the steps :-

In the **Database tree**, Click on the required file for **Contour** creation, e.g.



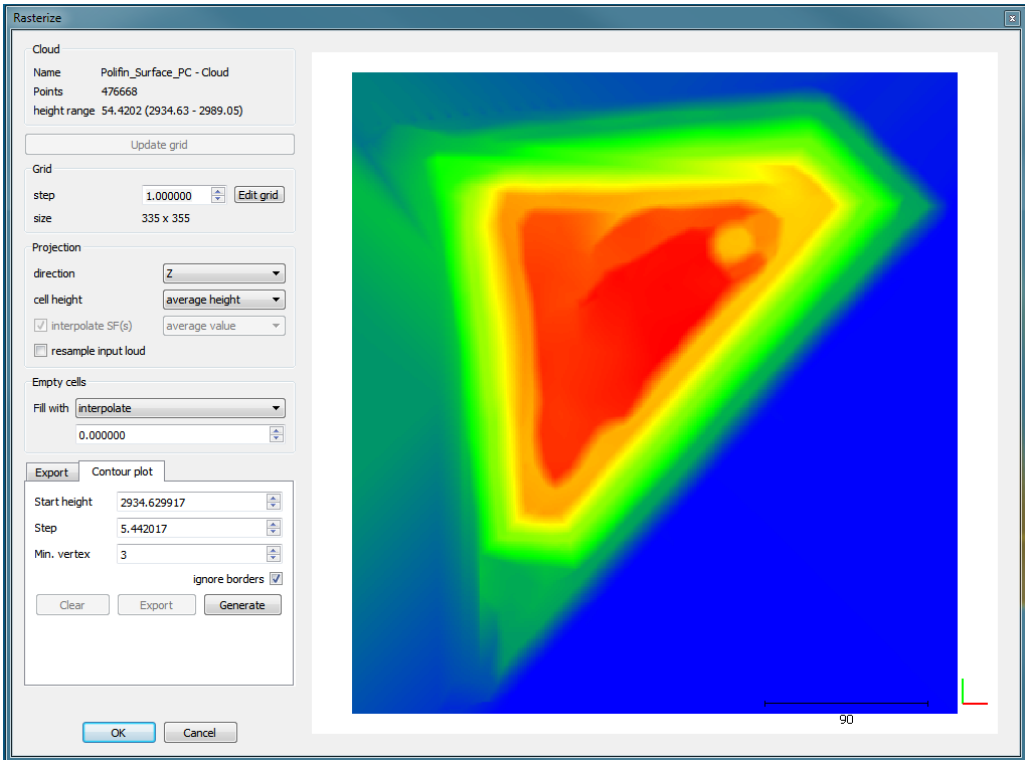
Then follow the menu path :-

Tools/Projection/Rasterize (and contour plot)

On the displayed form, you need to enter a **Grid Step** value. This value must be realistic for the model being rasterized. For example, for a standard survey of a mine dump, pit or opencast area, a Grid Step of about 1 (i.e. 1 metre) should be about right.

After entering the **Grid Step**, click on the **Upgrade Grid** bar, shown in red.

If you see the plot area on the right of the form displayed as a single colour block, then this normally means that the **Grid Step** chosen is too small. Choose a new, larger **Grid Step** and again click the **Upgrade Grid** bar.

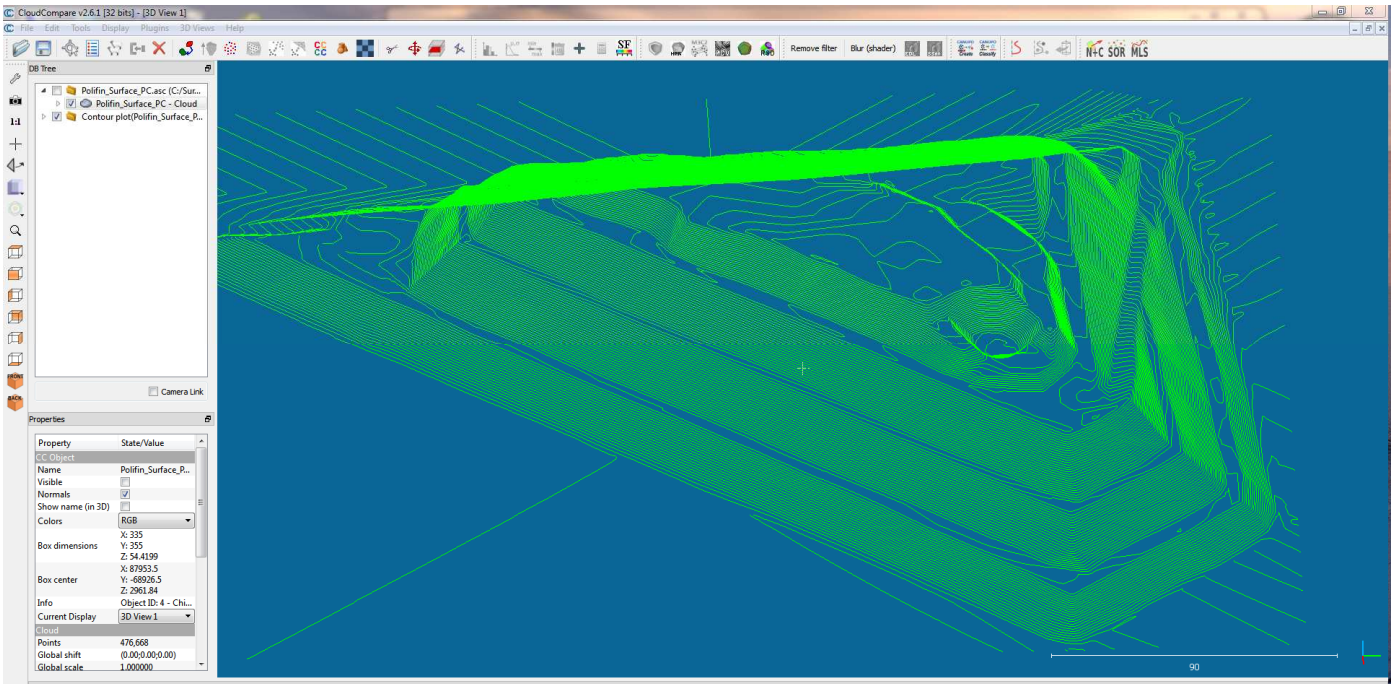


Near the bottom of the left hand side information block, click on the **Contour** tab. Change the **Start Height** value to the lowest required **Contour height** and then finally change the **Step** value to the required **Contour interval**. Leave the **Min**. **Vertex** at its default value.

Click the [**Generate]** button to generate the **Contours**. On completion, the **Contours** will appear on top of the rasterized image on the form.

To include these contours in the **Database** tree, click the [**Export**] button and then click the [**OK**] button at the bottom of the form.

NB : *If the Point Cloud file has a **Vertical Exaggeration** <> 1, then the **Contours** generated will not be true ground values, but rather values that fit to the model selected. If you intend to use the generated **Contours** for export to **SURPAC**, or to any other application, set the **Vertical Exaggertion** to **1.00000** before importing the surface Point Cloud into **CloudCompare**.*



Contours created in CloudCompare from a SURPAC Surface DTM model

These **CloudCompare Contours** can be exported as either a **DXF** file or as a **Shapefile**. Either of these file types can be rimported into the **SURPAC General CAD** programme

To export a **CloudCompare Contour** file, follow the menu path :-

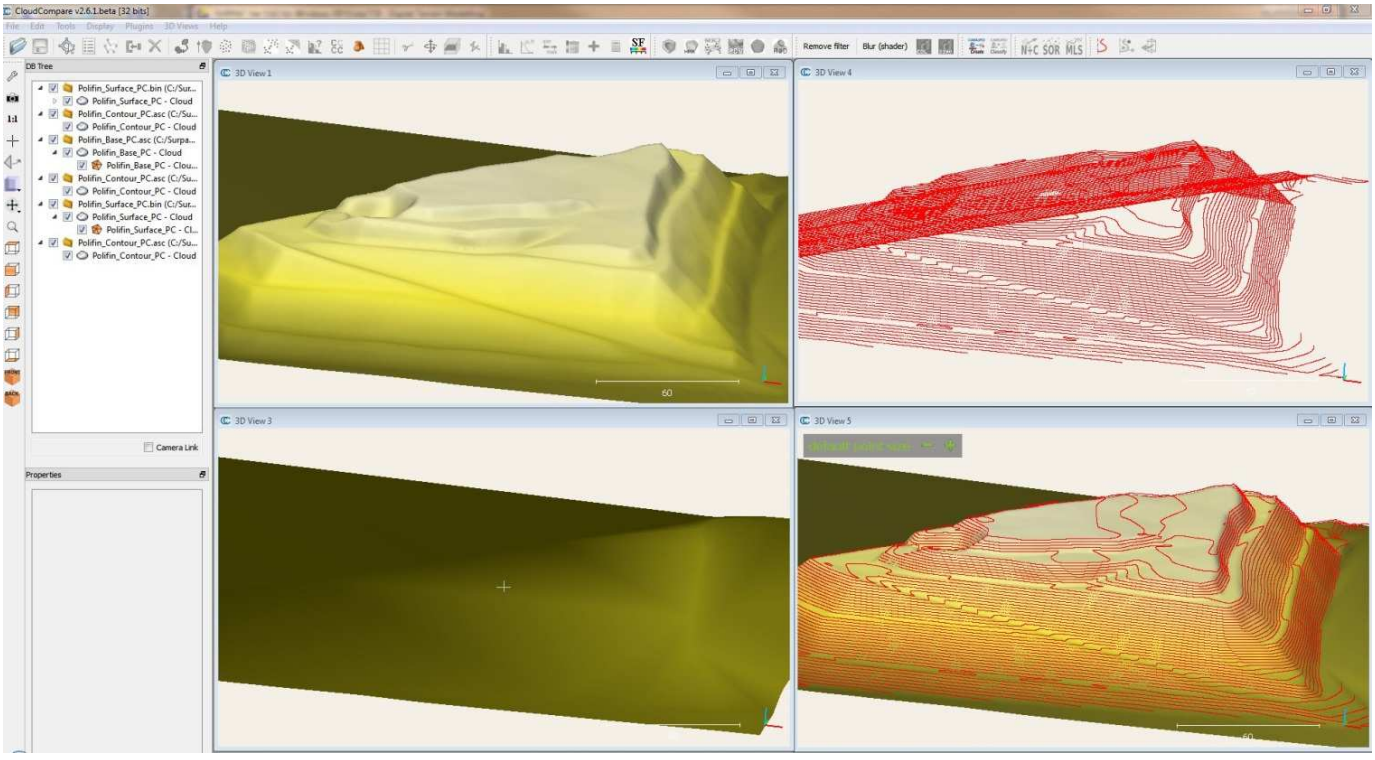
File/Save

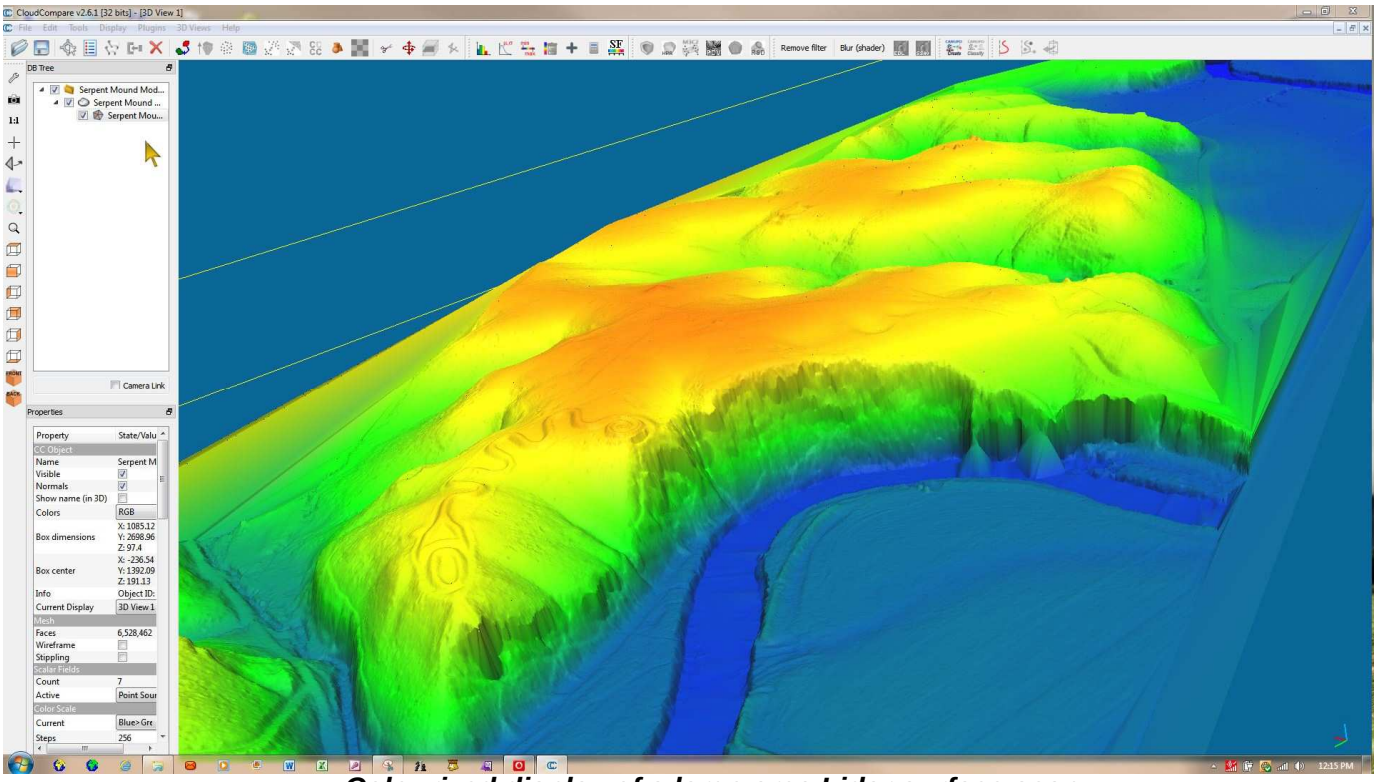
In the displayed **Save file** form, you can change the **Path** and **Name** of the file to be exported, as well as its **type** (normally **DXF** or **Shapefile**).

Summary

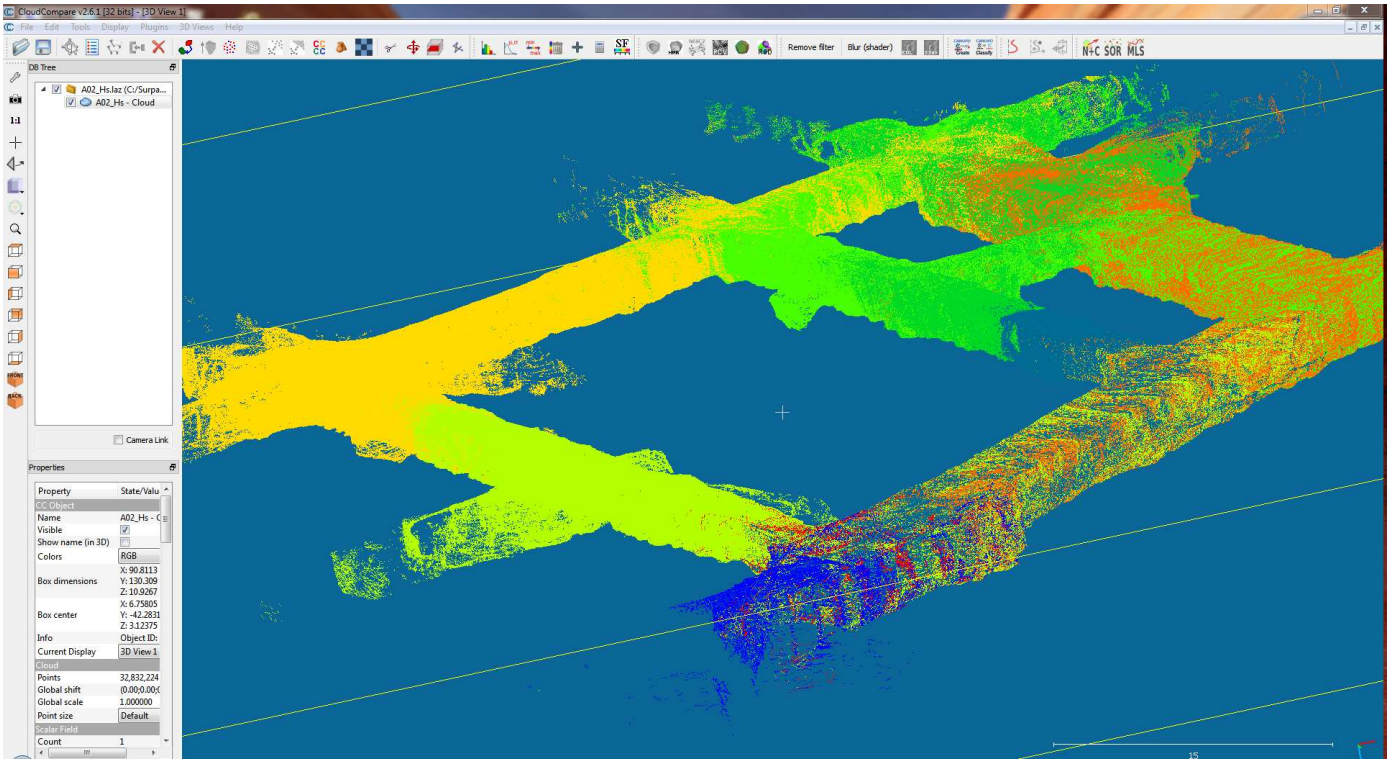
In the preceeding pages I have only touched on the **CloudCompare** functions that relate to topographical and mining survey applications. **CloudCompare** can be used for a variety of other applications and I would advise users to refer to the ***CloudCompare v2.61 – User Manual***, which can be found in either the **SURPAC** installation folder (usually **C:\Surpac Software**) or in the sub folder (if it exists) called **C:\Surpac Software\Surpac Manuals**.

Some further display taken from files imported into **CloudCompare** are shown below :-

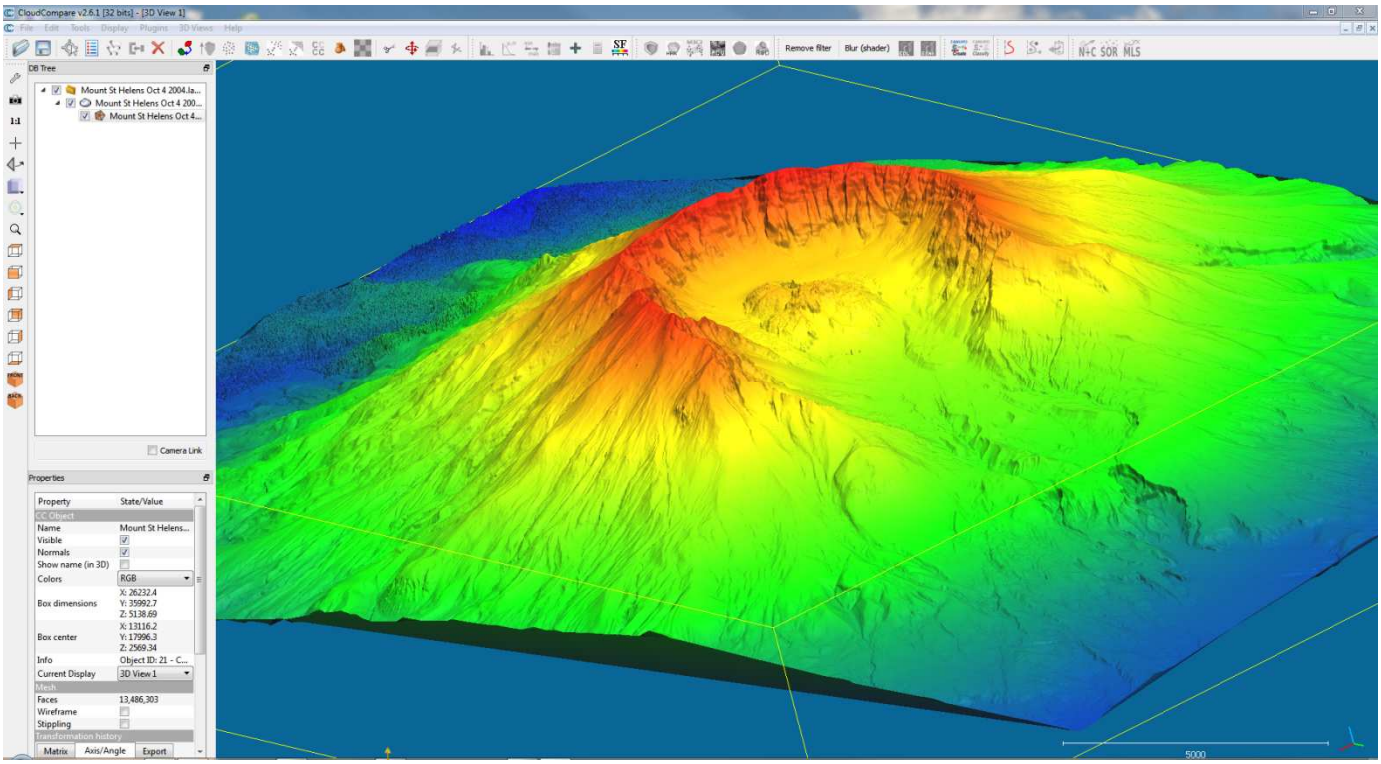




Colourized display of a large area Lidar surface scan



Colourized display of a scan of mine underground shafts



Colourized display of a Point Cloud of Mount St. Helens (after the eruption)

The last three samples are typical, large Point Cloud files imported and viewed in **CloudCompare**. This function can be used by following the **SURPAC** menu path :-

Mining/View a Point Cloud

CloudCompare is able to load, display and edit Point Cloud files of the following types :-

Supported file formats

Type	Extension(s)	Description	Read	Write	Binary/ASCII	Point Cloud(s)	Mesh(es)	Other	Features
BIN	.bin	CloudCompare own format	X	X	binary	>1	>1	>1	Normals Colors (RGB) Scalar fields (>1) + Labels, viewports, display options, etc.
ASCII	.asc .txt .xyz .neu .pts	ASCII point cloud file (X,Y,Z,etc.)	X	X	ASCII	1			Normals Colors (RGB) Scalar fields (>1)
LAS	.las	ASPRS[7] lidar point louds	X	X	binary	1			Colors (RGB) Various scalar fields (see LAS 1.4 specifications)
E57	.e57	ASTM E57[8] file format	X	X	mixed	>1		Calibrated picture(s)	Normals Colors (RGB or I) Scalar field (*intensity*)
PTX	.ptx	LEICA point cloud export format	X		ascii	>1		Sensor(s)	*Robust normals can be computed at loading time*
FARO	.fls .fws	FARO formats	X		binary	>1		Sensor(s)	Scalar field (reflection value)
DP	.dp	DotProduct DPI-7 format	X		binary	>1		Sensor(s)	Colors (RGB) *Robust normals can be computed at loading time*
PCD	.pcd	Point Cloud Library format	X	X	binary	>1			Colors (RGB) Normals Scalar fields (>1)
PLY	.ply	Stanford 3D geometry format[9] (cloud or mesh)	X	X	both	1	1		Normals Colors (RGB or I) Scalar fields (all) Single texture
OBJ	.obj	Wavefront[10] mesh	X	X	ASCII	1	>1	Polyline(s)	Normals Materials and textures
VTK	.vtk	VTK file format (triangular mesh or cloud only)	X	X	ASCII	1	1		Normals Colors (RGB) Scalar fields (>1)
STL	.stl	STereoLithography[11] file format (mesh)	X	X	ASCII		1		Normals
OFF	.off	Object File Format[12] (mesh)	X	X	ASCII		1		

File types supported by CloudCompare

FBX	.fbx	Autodesk (Filmbox) File format[13]	X	X	ASCII or binary	>1	>1		Normals Colors (RGB) Materials and texture
DXF	.dxf	Autocad DXF format[14]	X	X	ASCII	>1	>1	Polyline(s)	Normals Colors (RGB)
SHP	.shp	ESRI Shape file format[15]	X	X	binary	>1		Polyline(s) polygon(s) Contour plot(s) etc.	Scalar fields (1 per entity)
PDMS	.pdms .pdmsmac .mac	PDMS macros	X		ASCII		>1	Primitive(s)	
RASTER	.geotiff, etc.	Common raster formats (GDAL)[16]	X	X[17]	binary	1			Layers (as scalar fields)
OUT (Bundler)	.out	Bundler SfM output file[18]	X		ASCII	(1)		Calibrated picture(s) 3D keypoints	
2D images	.jpg *.png *.bmp etc.	Standard images			binary				
PV	.pv	Point cloud + scalar field	X	X	binary	1			Scalar field (1)
PN	.pn	Point cloud + normals	X	X	binary	1			Normals
SOI	.soi	Mensi/Trimble Soisic laser scanner	X		ASCII	>1			Colors (I)
POV	.pov	Multiple stations (meta file)	X		ASCII + both	>1			All + sensor poses
ICM	.icm	Cloud + calibrated pictures	X		ASCII + both	1		Picture(s)	All + camera poses
Geo-Mascaret	.georef	Mascaret profiles[19]	X		ASCII			Profiles (polylines)	
Sinusx	.sx	Sinusx curves	X	X	ASCII			Polylines	
CSV matrix	.csv	Cloud as 2D1/2 matrix	X		ASCII	1			

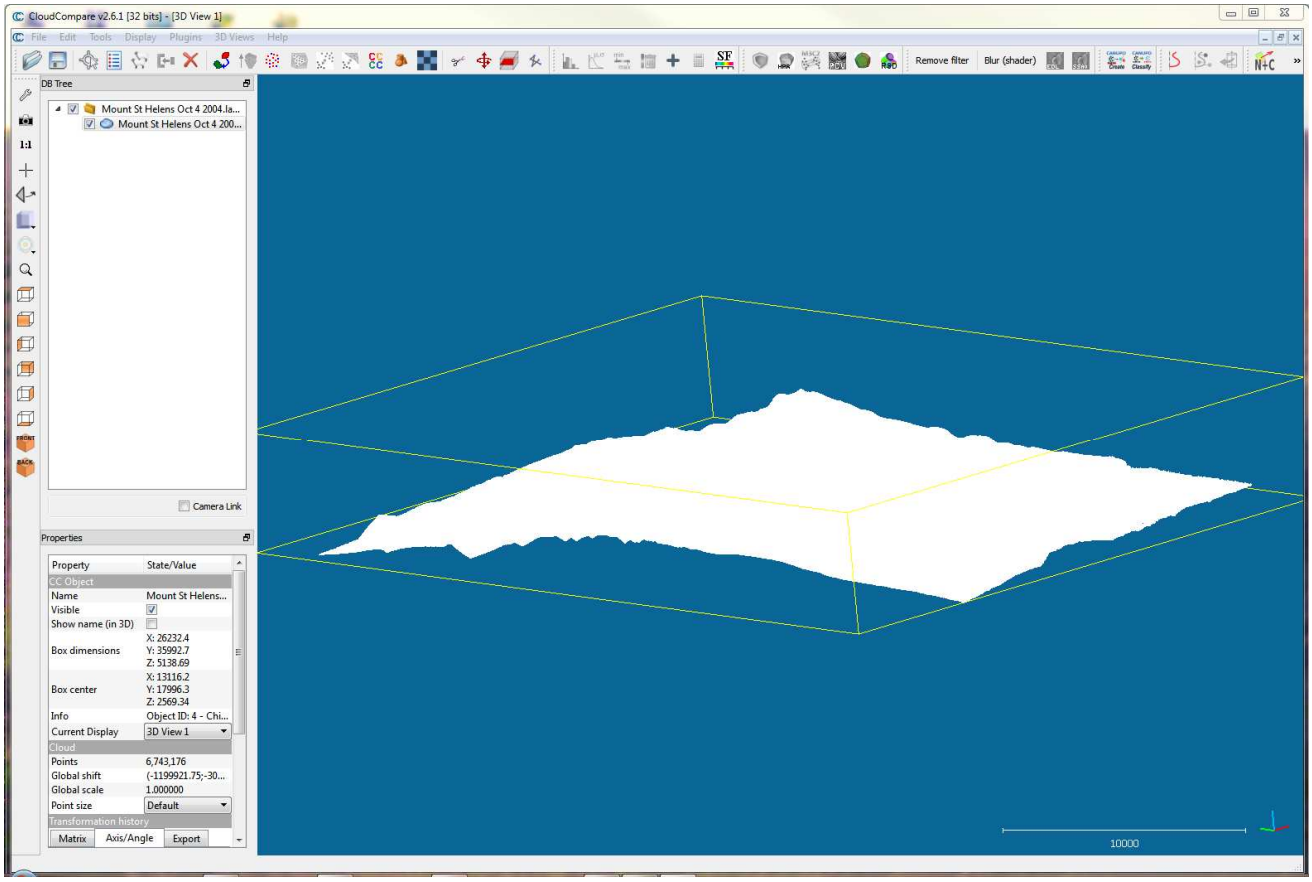
File types supported by CloudCompare (Continued)

Editing and Colourizing an Imported Point Cloud Mesh in CloudCompare

When importing a Point Cloud file of type ***.las (or its compressed version of ***.laz) the initial display can be very uninformative. Take, for example, the Mount ST. Helens example shown on Page 16. The image shown is the final image after meshing and colourizing have taken place.

When the file is initially imported, a form is displayed showing default settings for the importing of the file. Leave these default settings as displayed and just click the [**OK**] button. Depending on the values of the X, Y co-ordinates in the file, the **Global Shift/Scale** form may be displayed (See Page 6). Respond as is appropriate. Normally the default suggested shifts should be accepted.

CloudCompare will then proceed to load the Point Cloud file, which initially looks like :-

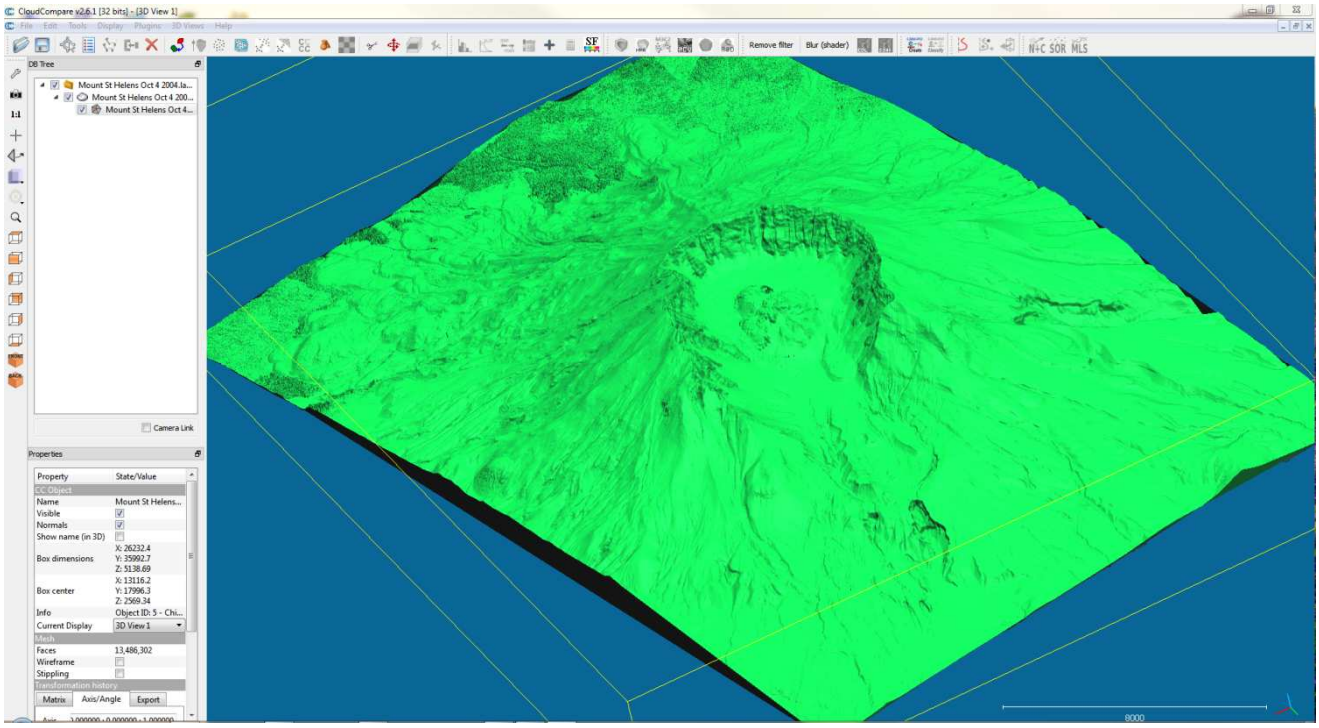


Initial display of an ***.las Point Cloud (St. Helens)

With the Point Cloud file highlighted in the **Database** (See Page 9), follow the menu path :-

Edit/Mesh/Delaunay 2,5D (XY plane)

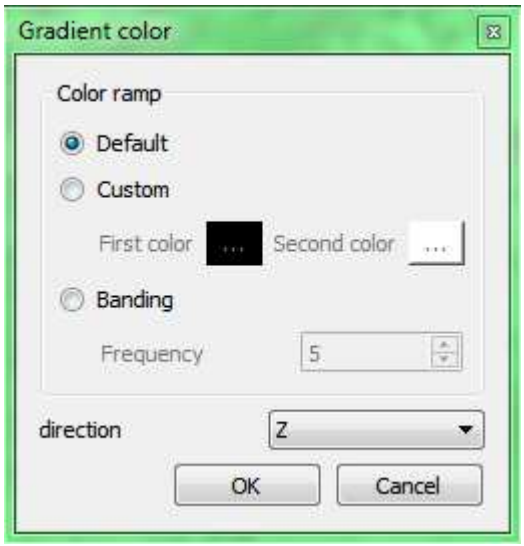
On the displayed form, leave the **Max. Edge length** as 0. Triangulation and creation of the **Mesh** file will now take place. Make sure that the **Normals** value in the **Properties** section is checked.



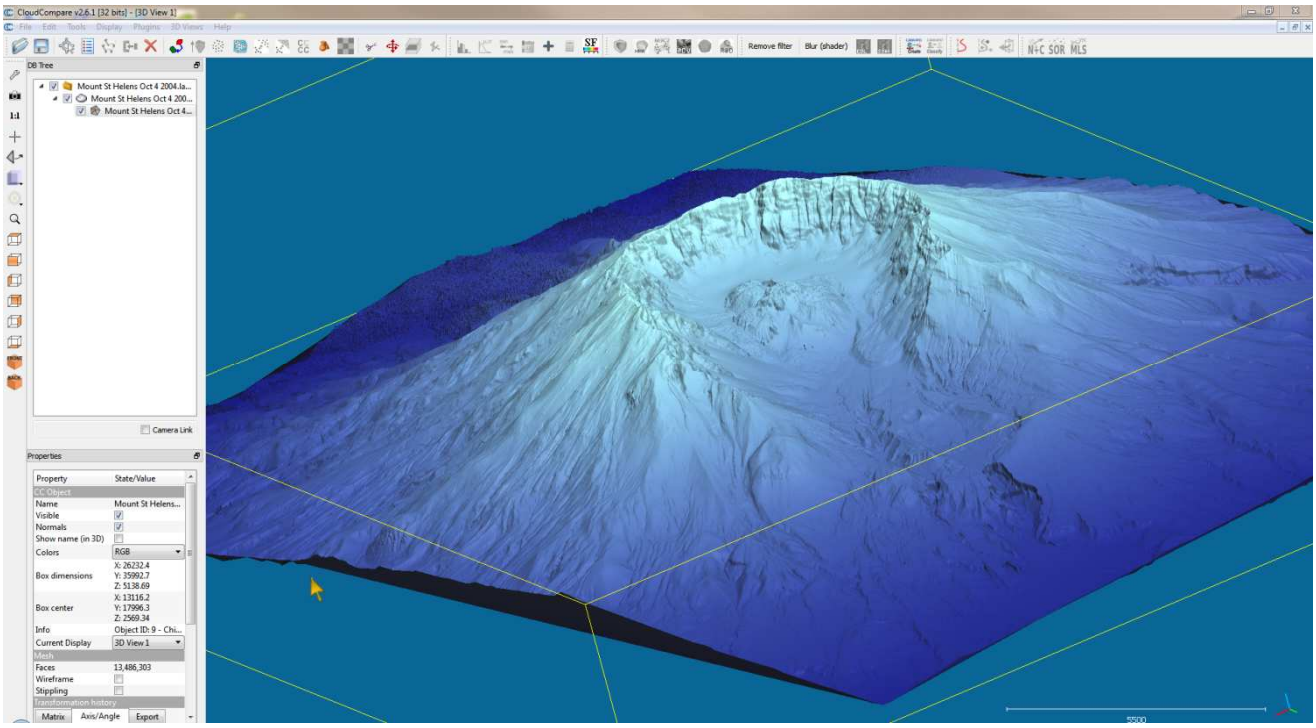
The above image shows the St. Helens example after creation of the **Mesh** file and switching the **Normals** display on.

To **Colourize** the model, as displayed on Page 16, follow the menu path :-

Edit/Colors/Height Ramp



On the displayed form you can either select the required colour range (First color and Second color), or just accept the default black to white colour range. Setting the colour range to dark blue to light blue, for example, gives a display as :-



Colourized display of Mount St. Helens using a single colour range

Using the default colour range (black to white) creates the model as shown on Page 16.

Other useful CloudCompare functions

1. The current **Display** in **CloudCompare** can be saved as an **Image** file by using the Menu path :-

Display/Render to File

2. The **Surface Area** of a **Mesh** file can be computed using the Menu path :-

Edit/Mesh/Measure Surface

3. A display model of a Point Cloud can also be generated using the Menu path :-

Plugins/Poisson Surface Reconstruction

4. Once a **Mesh** file has been developed, it can be save using any of the formats supported by **CloudCompare** (See pages 17 and 18).

5. The background colour and colours of other display items can be reset using the Menu path :-

Display/Display Settings

6. Refer to the **PDF** manual **CloudCompare v2.61 – User Manual** for a full description of the available **CloudCompare** commands and functions.

Other SURPAC Modifications

1. Corrections have been made to the **Gyro Calibration** programmes for **Northern** Hemisphere (using **UTM**) systems.

2. Printout of the **Co-ordinate List** – The number of characters for the **Descriptions** has been increased.

3. **Contour CAD programme** - **DXF**/**DWG** Output of Smoothed (Spline) **Contours** now uses the **Polyline** method.

4. **General Plan CAD** -Naming of Main figure Points extended to include 1A ...1Z, 2A ...2Z, etc.

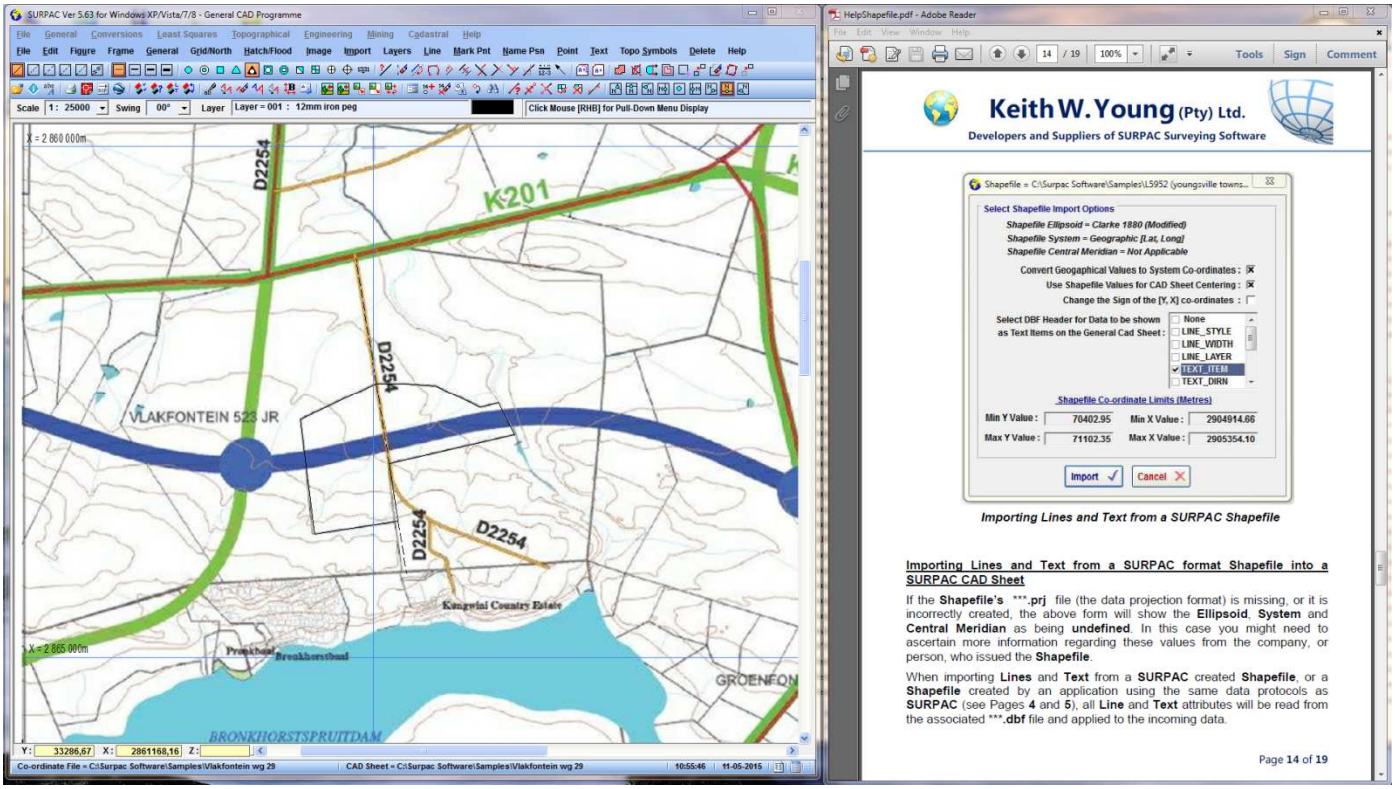
5. Modification of the **Diagram CAD** Programme to cater for **Zambian** A4 and A3 Diagrams.

6. The problem encountered when importing **contour labels** into the **General CAD** programme has been resolved.

7. Exported **Shapefile Polygons** from the **General Plan CAD** had incorrect orientations. This has now been corrected.

8. Corrections have been made to both the **General Plan** and **GP Data Sheet** programmes for the **UTM** (North Oriented) Systems.

9. **Google Earth Pro** is now a free download. **SURPAC** has been modified so as to first search a computer for the installation of **Google Earth Pro** and then, if it is not found, to search for the installation of **Google Earth**. Among other improvements **Google Earth Pro** provides higher resolution **images** for downloading into **SURPAC CAD** programmes.
10. All **SURPAC CAD** programmes, plus some other non-CAD programmes, now have improved **Help** files. These new **Help** files are in **PDF** format so you need an installed **PDF** reader, such as **Adobe** to read these files. The new **Help** files are more detailed and include sample screen displays. Other **Help** files will be added in future for the remaining programmes.


SURPAC Ver 5.63 for Windows XP/Vista/7/8 - General CAD Programme
D2254
K201
VLAKFONTEIN 523 JR
Kangwini Country Estate
BRONKHORSTSPRUITDAM
HelpShapefile.pdf - Adobe Reader
Keith W. Young (Pty) Ltd.
Developers and Suppliers of SURPAC Surveying Software
Importing Lines and Text from a SURPAC Shapefile
Importing Lines and Text from a SURPAC format Shapefile into a SURPAC CAD Sheet
Page 14 of 19

Example of a Help information display for the General CAD programme.

The **CAD** programmes have all the Help files under the **Help** menu heading.

Other programmes have a

button, normally near the top left of the form.

11. An option has been added that allows **Co-ordinate files** to be printed with a **plus sign** in front of positive **Y** and/or **X** values. This option is shown at the bottom of the Option form displayed when the **[Print File]** command has been selected.

Before creating **General Plans**, it is advisable to apply an **X** constant to the Co-ordinate file, in order to bring the displayed **X** values to below 1,000,000. X values higher than this can cause the **GP** and **GP Data** sheet **X** values for **Text** items to be inaccurate. This becomes apparent when displaying lists of Text items that need to be uniformly spaced.

The SURPAC AutoPlan GP Creation function

This form of a **General Plan** is normally used for existing townships, villages, and other rural residential developments that have not been laid out according to a prescribed Town Planning manifesto, but which have been physically occupied in random positions. Some Stands may be contiguous and others free standing.

These types of developments need to be surveyed and registered in order to provide the land dwellers with a Title Deed, thereby "legalizing" their ownership of the property and providing them with a physical, non-movable asset that can be leased, sold or passed on to their heirs.

This function allows for the automatic generation of such a **General Plan**. This is possible as long as the structure of surveyed Points in the current Co-ordinate file complies with certain rules, as is described below.

Note that this function may also be used for the generation of more standard, pre-designed townships, as long as the required rules are followed.

General Point Naming Protocol

First, this structure requires that each Stand or Land Parcel must be allocated a number before the field survey begins. It does not matter if these Stand numbers are not the final numbers that may be allocated by the Surveyor General, or Director of Surveys, as they can be changed in **SURPAC** at a later date.

Secondly, the surveyed Points must be given **Point Names**, each of which has two important features. These features define which Stand the Point relates to, plus its position, in a clockwise direction, in the Stand.

Naming Option 1

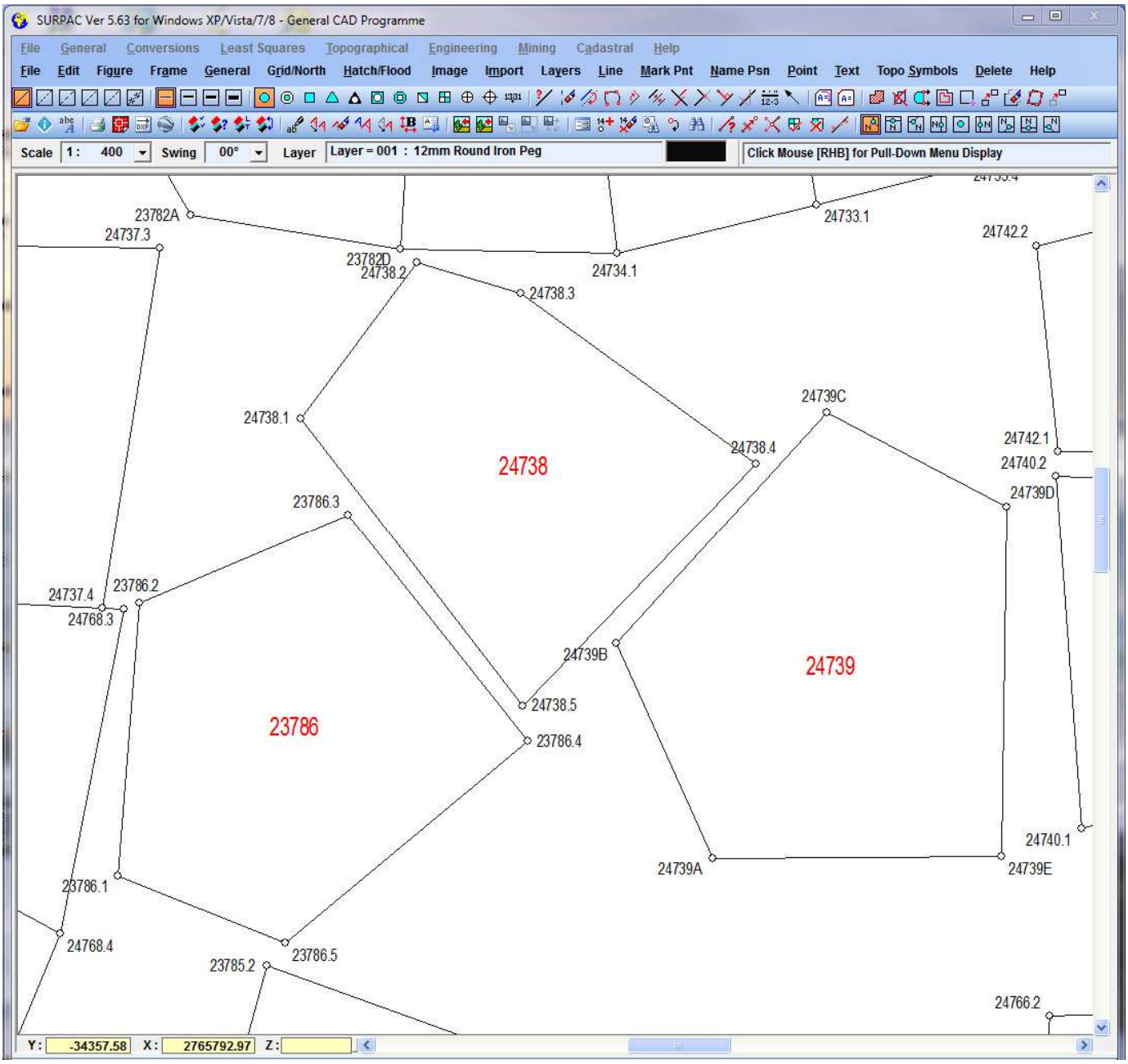
Using this option, the two Name elements are separated by a decimal point. The first part of the **Point Name** must be the same as the **Stand Number**, a corner of which is defined by that point. The second part of the **Point Name**, i.e. after the decimal point, is that Point's order in the Stand definition. It does not matter which Point is regarded as the first, or starting Point, but all Point numbering must follow in a clockwise direction.

For example, for a five sided **Stand** whose number is **24738**, the **Point Names** would be :- **24738.1**, **24738.2**, **24738.3**, **24738.4** and **24738.5**

Naming Option 2

Using this option, the two Name elements are simply the **Stand Number** a corner of which is defined by that point, followed by a character of the alphabet (from A to Z). This character defines that Point's order in the Stand definition. It does not matter which Point is regarded as the first, or starting Point, but all Point numbering, or naming, must follow in a clockwise direction.

For example, for a five sided **Stand** whose number is **24739**, the **Point Names** would be :- **24739A**, **24739B**, **24739C**, **24739D** and **24739E**

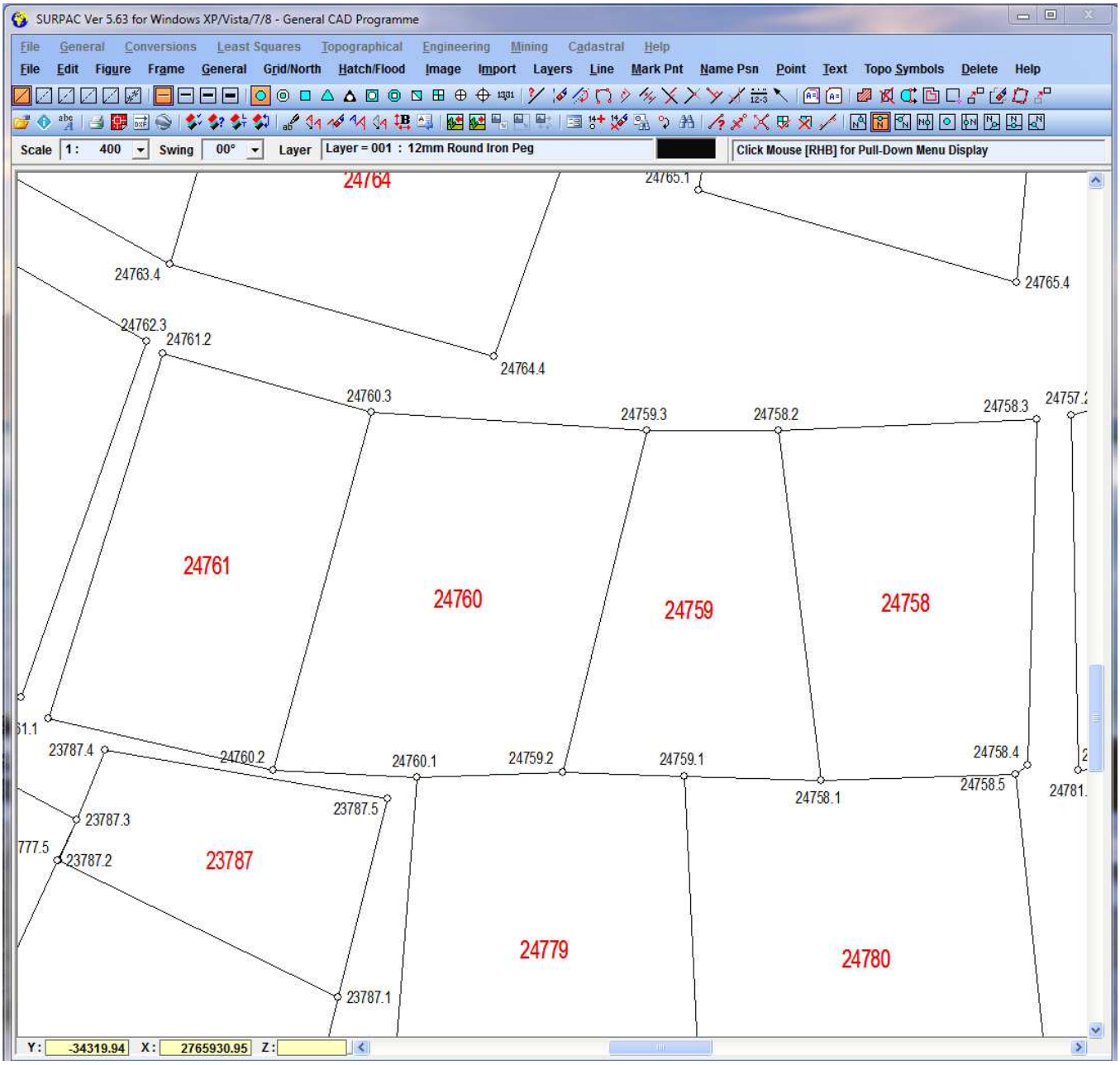


Display of three non-contiguous Stands and their surveyed Points.

Point Naming for Contiguous Stands

The Point Name structure remains exactly as described above. For non-contiguous Stands, Point naming is straight forward. However, for contiguous Stands, where a Point defines a common corner of two or more Stands, a bit of office “manual labour” is required to enable **SURPAC** to recognize that that Point is in fact common to the relevant Stands.

The image below shows contiguous Stands **24758**, **24759**, **24760** and **24761**.



Display of four contiguous Stands and their surveyed Points.

From this image, it can be seen that the **Stand 24758**, for example, is defined by the Points **24758.1**, **24758.2**, **24758.3**, **24758.4** and that **Stand 25759** is defined by the Points **24759.1**, **24759.2**, **24759.3**, **24758.2**, **24758.1**

This is because the line 24758.1 – 25758.2 is a common boundary for Stands **24758** and **24759**. **SURPAC** needs to be able to recognize this fact before the General Plan construction begins. What needs to be done to correctly define Stand 24759 is to create two theoretical Points, namely **24759.4** and **24759.5**

NB : Before starting this procedure, regardless of which method is used, the **Co-ordinate file** must be in the **Cadastral Mode** and its **Heading** must have its ***Label Field #1*** set to the option ***Alternate Name***.

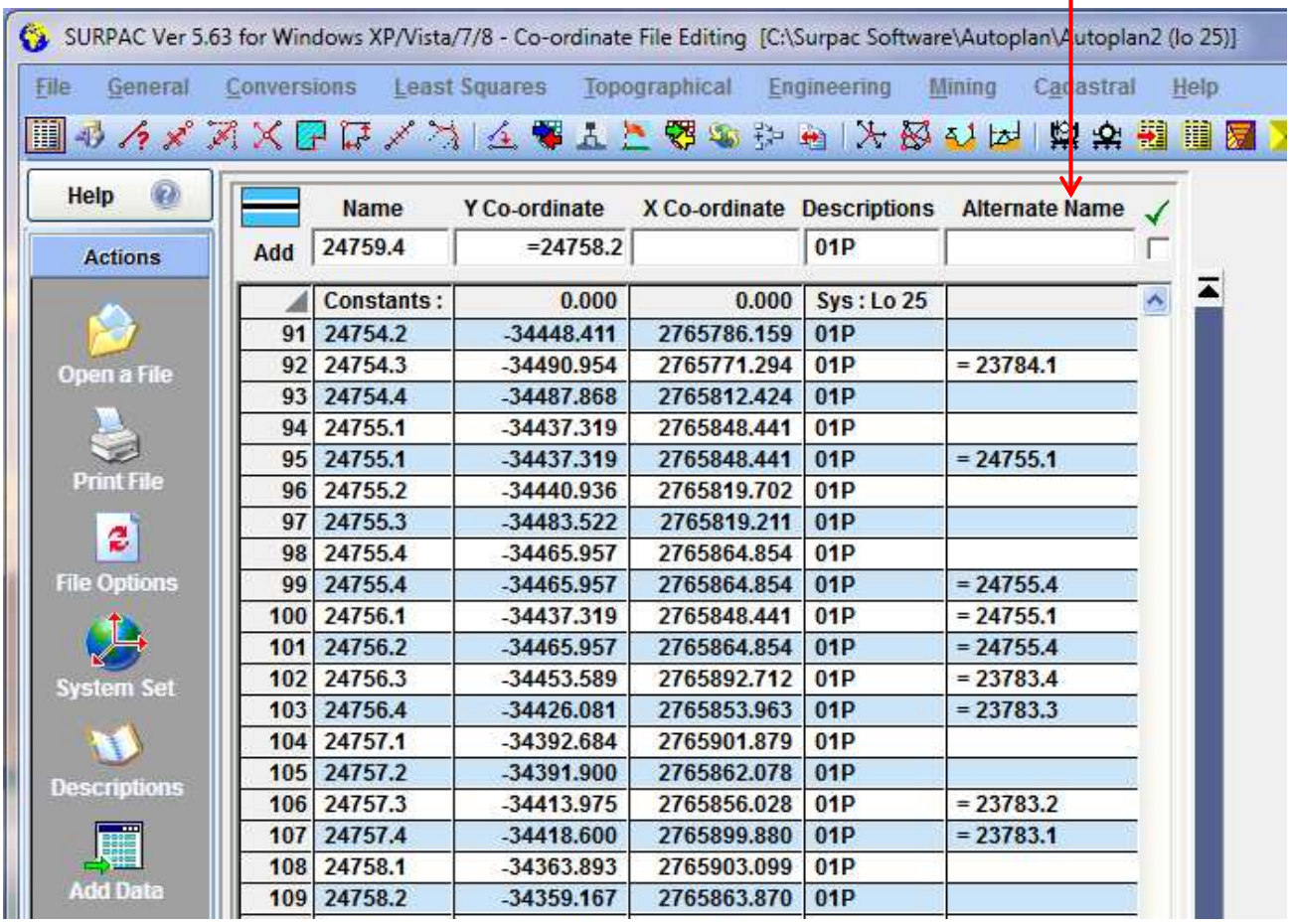
There are two methods of generating the necessary theoretical Points are :-

Method 1

- In the **Co-ordinate File Editing** programme, click on [**Add Data**] button in the **Actions** bar menu.
- In the ***Name*** Input Box, enter ***24759.4*** press Enter
- In the ***Y co-ordinate*** (or ***Eastings***) Input Box enter ***=24758.2***
- **SURPAC** will then create a Point called **24759.4** and allocate to it the co-ordinate of the existing Point **24758.2**

Repeat this procedure for all required theoretical points.

Label Field #1 **must be set to** ***Alternate Name***

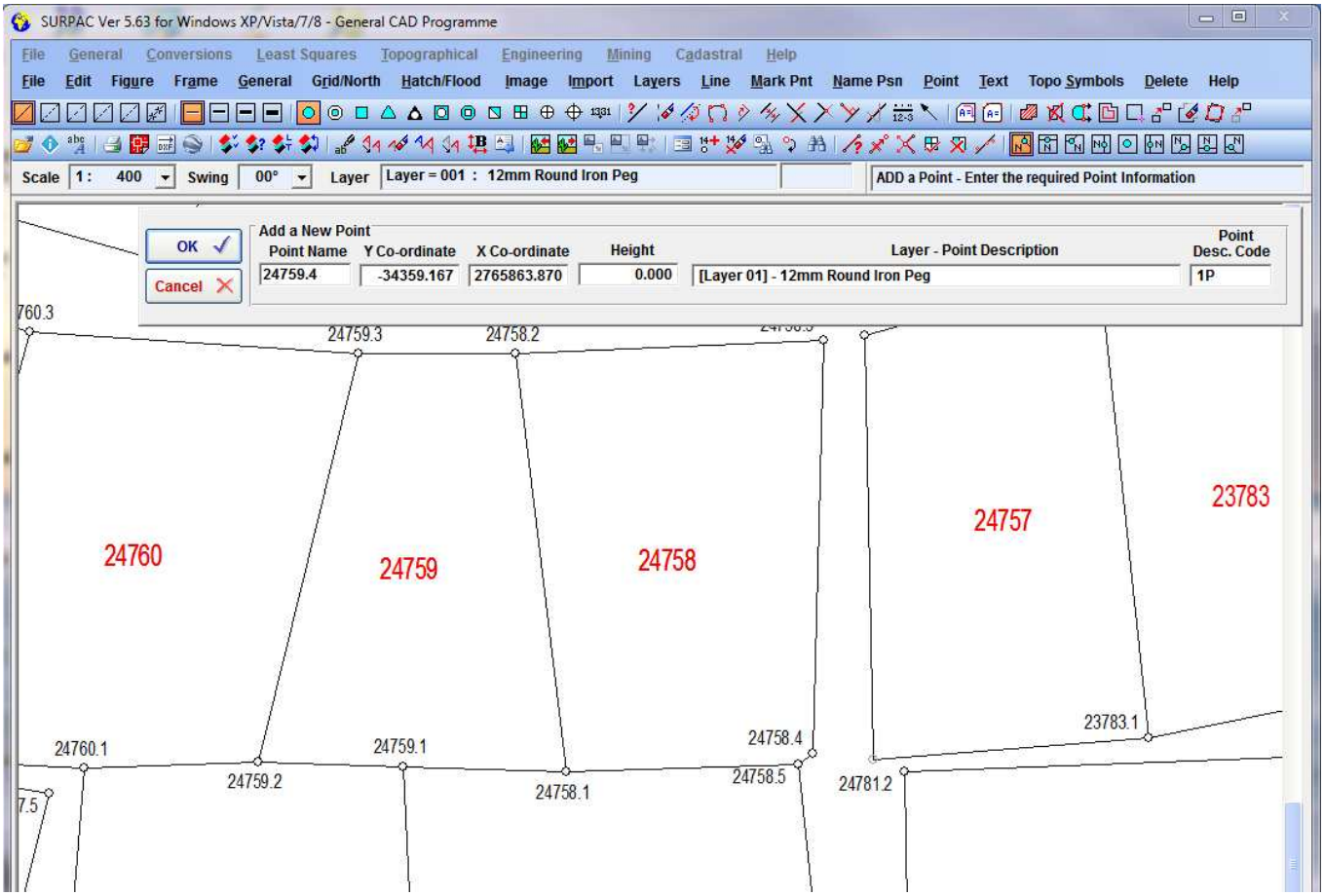


Creating theoretical Points by duplicating surveyed Points – Method 1

Method 2

- Load either the **General CAD** the **General Plan CAD** programme.
- Display the Stands as shown by the existing, surveyed points.
- Right Click on, or close to, the Point **24758.2** and, from the **Point** menu heading, select the item **Add a new Point**.
- On the displayed form, change the default Name to **24759.4**
- **SURPAC** will then create a Point called **24759.4** and allocate to it the co-ordinate of the existing Point **24758.2**

Method 2 above, has the advantage of being able to use the Mouse [**MB**] as a "repeat last command" option. This allows for more rapid creation of the theoretical Points.


SURPAC Ver 5.63 for Windows XP/Vista/7/8 - General CAD Programme
File General Conversions Least Squares Topographical Engineering Mining Cadastral Help
File Edit Figure Frame General Grid/North Hatch/Flood Image Import Layers Line Mark Pnt Name Psn Point Text Topo Symbols Delete Help
Scale 1 : 400 Swing 00° Layer Layer = 001 : 12mm Round Iron Peg
ADD a Point - Enter the required Point Information
OK
Cancel
Add a New Point
Point Name Y Co-ordinate X Co-ordinate Height Layer - Point Description Point Desc. Code
24759.4 -34359.167 2765863.870 0.000 [Layer 01] - 12mm Round Iron Peg 1P
760.3
24759.3
24758.2
24760
24759
24758
24757
23783
24760.1
24759.2
24759.1
24758.1
24758.4
24758.5
24781.2
23783.1
7.5

Creating theoretical Points by duplicating surveyed Points – Method 2

In both Methods, the theoretical Point's source Point (from which its data were derived) will be shown in the ***Alternate Name*** column.

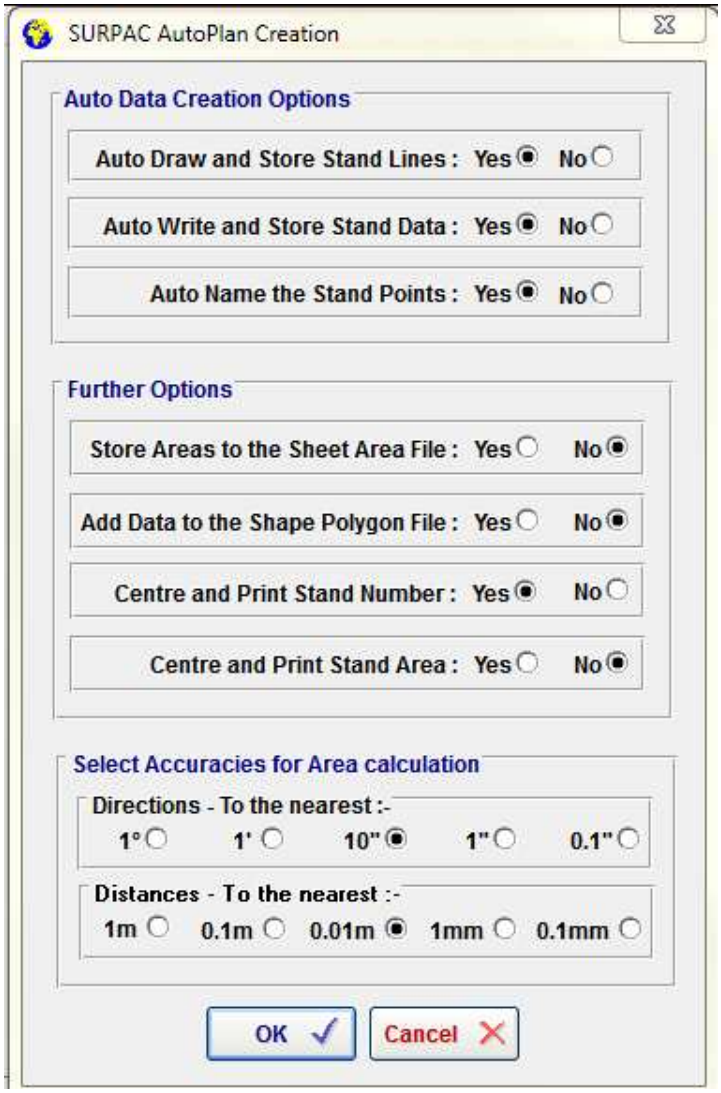
NB : *These theoretical Points will <u>not</u> be shown on either a **General Plan** Sheet, a **Working Plan** Sheet, a **General CAD** Sheet, or in a **GP Data Sheet**.*

*When creating a theoretical Point, **SURPAC** will automatically allocate the Point Description of "**22C**" (Calculated Point). To suppress the display of these theoretical Points in the printed Co-ordinate list, uncheck the Category "Calculated Points" before printing the file.*

Running the AutoPlan GP Creation function

Load the **General Plan CAD** programme and go through the normal Sheet Set Up process.

Select the **AutoPlan GP Creation** menu item found under the **Data** menu heading, or press [**Ctrl**]+[**P**].


SURPAC AutoPlan Creation
Auto Data Creation Options
Auto Draw and Store Stand Lines : Yes No
Auto Write and Store Stand Data : Yes No
Auto Name the Stand Points : Yes No
Further Options
Store Areas to the Sheet Area File : Yes No
Add Data to the Shape Polygon File : Yes No
Centre and Print Stand Number : Yes No
Centre and Print Stand Area : Yes No
Select Accuracies for Area calculation
Directions - To the nearest :-
1° 1' 10" 1" 0.1"
Distances - To the nearest :-
1m 0.1m 0.01m 1mm 0.1mm
OK
Cancel

The AutoPlan GP Creation option form

The **AutoPlan GP Creation** option form provides for a number of automatic data creation options.

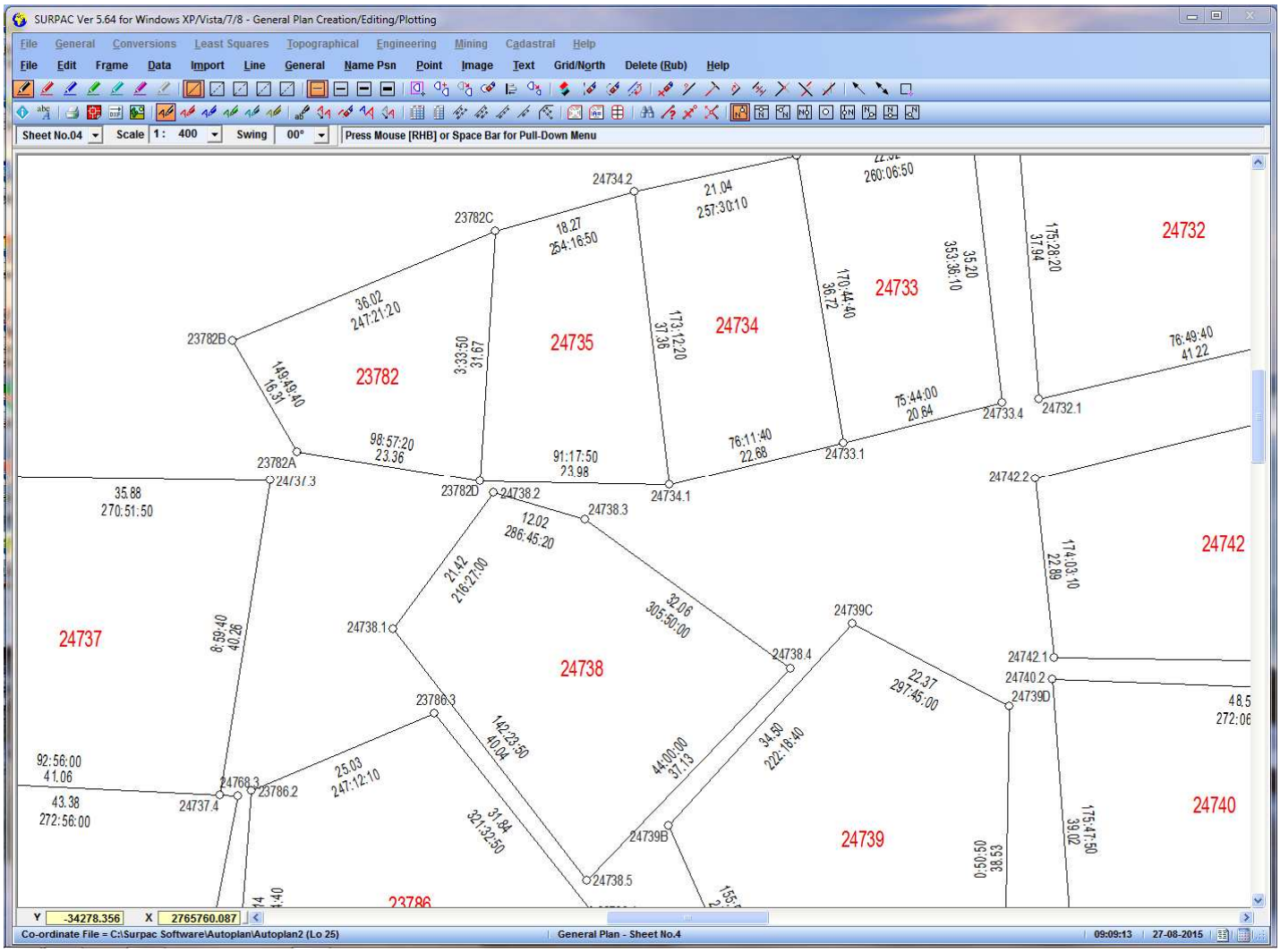
The first three options allow for the auto-creation and/or display of the :-

- **Stand Lines**,
- **Stand Data** and
- **Stand Points**.

Further options allow for :-

- Adding the calculated **Areas** to the Sheet **Area** File,
- Adding each **Stand** to the Sheet's **Shape Polygon** File,
- Centring and **Printing** the **Stand Number** and
- Centring and **Printing** the **Stand Area**.

After completing the option selection on the above form, Click the [**OK**] button to begin the **AutoPlan GP Creation** process.



After completion of the **AutoPlan GP Creation** process, the Sheet needs to be inspected for any missing data, Point Names that overlap boundaries, duplicate Line etc., and then to rectify these in the normal manner.

Grid Marks and **Headings** need to be added and the **GP Co-ordinate** and **Area Data** can be generated and then imported onto the GP Sheet at the required location.

The SURPAC Auto Diagram Creation function

There are now five methods for compiling a **Diagram** in **SURPAC**.

Method #1 - Selecting Points from the Co-ordinate file List

This is the original method for **Diagram** creation in **SURPAC**. Please refer to previous documentation.

Method #2 – Graphically Selecting Points from a Working Plan Sheet

This method for **Diagram** creation pre-exists in **SURPAC**. Please refer to previous documentation

Method #3 – Graphically Selecting Points from a General CAD Sheet

This method for **Diagram** creation pre-exists in **SURPAC**. Please refer to previous documentation.

Method #4 – Entering a Stand Number shown on a General CAD Sheet

This is a new method for **Diagram** creation. It is a semi-automatic method that only requires the entry of a **Stand Number** that exists on the current **General CAD** Sheet. In order for this method to work, data for the township, or sub-division area in question must exist on the current **General CAD** Sheet.

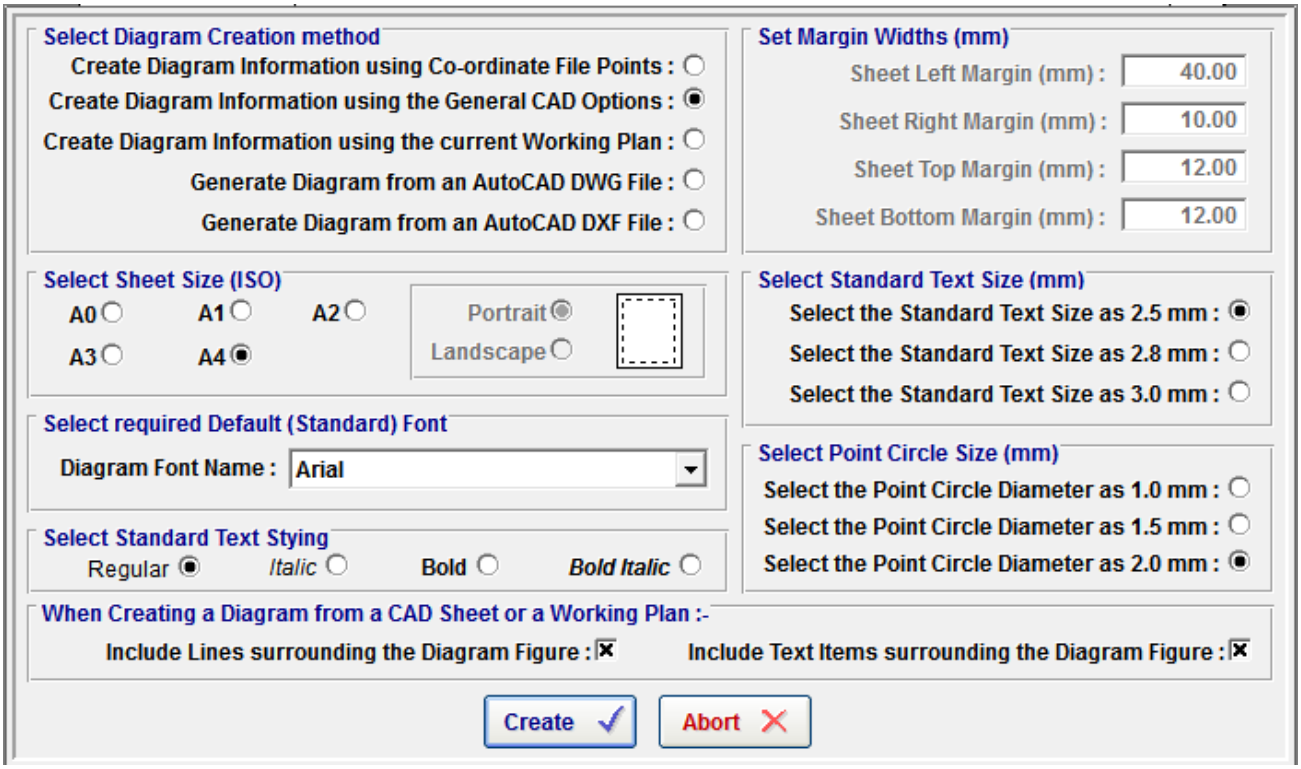
If the township has been generated in the **General Plan CAD** programme, then all the **Line** and **Text** data must first be imported in to **General CAD** Sheet. This can be done as follows :-

- Set Up a **General CAD** Sheet in the normal manner,
- click on the **Import** menu heading and then select the item **Import from a General Plan Sheet**.
- When prompted, select the appropriate **GP Sheet** from which data are to be imported.
- On the subsequent form, select **Both Lines and Text**, **All Pens** and **Use Line Colour** option.
- The **GP Pen #1** data will be allocated to **Layer #1**, **Pen #2** data to **Layer #2** etc.
- Use the **Layer to Layer Data** exchange function (under the **Layers** menu heading) to move all **Layer #1 Text** items to **Layer #3**.
- Finally, restrict **Layer visibility** to **Layers #1** and **#2**.

The last two actions are to ensure that the data Text items, such as distances and directions do not interfere with the polygon boundary location function required for both **Method #4** and **Method #5**.

Programme Operation

Load the **Diagram CAD** programme and open a new file, using the required **Stand Number**. In this example, Stand Number **24764** is used.


Select Diagram Creation method
Create Diagram Information using Co-ordinate File Points :
Create Diagram Information using the General CAD Options :
Create Diagram Information using the current Working Plan :
Generate Diagram from an AutoCAD DWG File :
Generate Diagram from an AutoCAD DXF File :
Set Margin Widths (mm)
Sheet Left Margin (mm) : 40.00
Sheet Right Margin (mm) : 10.00
Sheet Top Margin (mm) : 12.00
Sheet Bottom Margin (mm) : 12.00
Select Sheet Size (ISO)
A0 A1 A2 A3 A4
Portrait
Landscape
Select Standard Text Size (mm)
Select the Standard Text Size as 2.5 mm :
Select the Standard Text Size as 2.8 mm :
Select the Standard Text Size as 3.0 mm :
Select required Default (Standard) Font
Diagram Font Name : Arial
Select Point Circle Size (mm)
Select the Point Circle Diameter as 1.0 mm :
Select the Point Circle Diameter as 1.5 mm :
Select the Point Circle Diameter as 2.0 mm :
Select Standard Text Stying
Regular Italic Bold Bold Italic
When Creating a Diagram from a CAD Sheet or a Working Plan :-
Include Lines surrounding the Diagram Figure :
Include Text Items surrounding the Diagram Figure :
Create
Abort

On the form displayed above, select the option **Create diagram Information using the General CAD Options**. Also select any other required options such as Sheet size, Sheet orientation, margins, surrounding data etc. When complete, click the [**Create**] button.

The following form will now be displayed. Select the item **Auto-Generate Diagram Data using Stand Number** option. The Stand Number entered for the file name (in this case 24764) will become the default Stand Number.

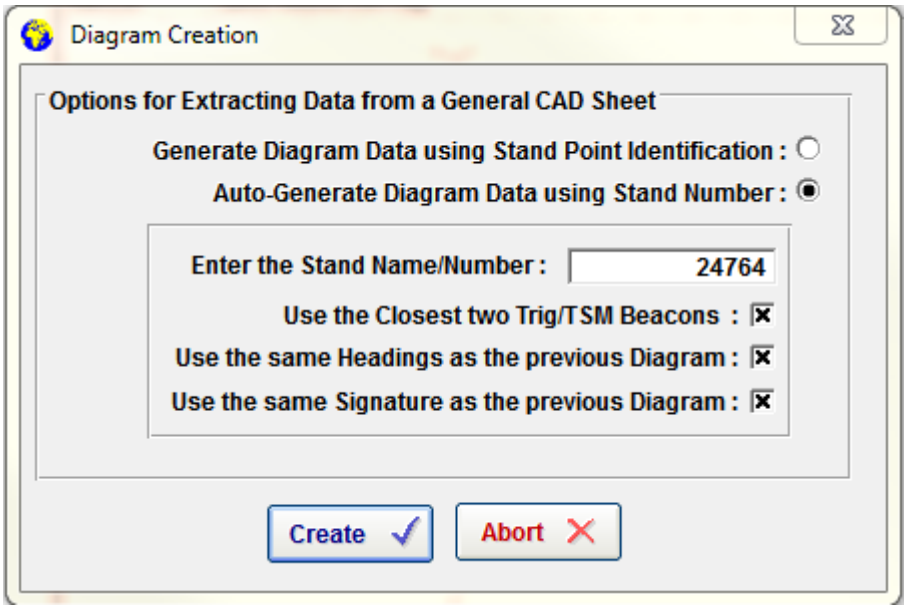


Diagram Creation
Options for Extracting Data from a General CAD Sheet
Generate Diagram Data using Stand Point Identification :
Auto-Generate Diagram Data using Stand Number :
Enter the Stand Name/Number : 24764
Use the Closest two Trig/TSM Beacons :
Use the same Headings as the previous Diagram :
Use the same Signature as the previous Diagram :
Create
Abort

Below the **Stand Number** are three further options.

- If you want the programme to automatically select the closest two **Trig Beacons** or **TSM**s, then select this option.
- If you have standard **headings** for this township which were created or used in the previous

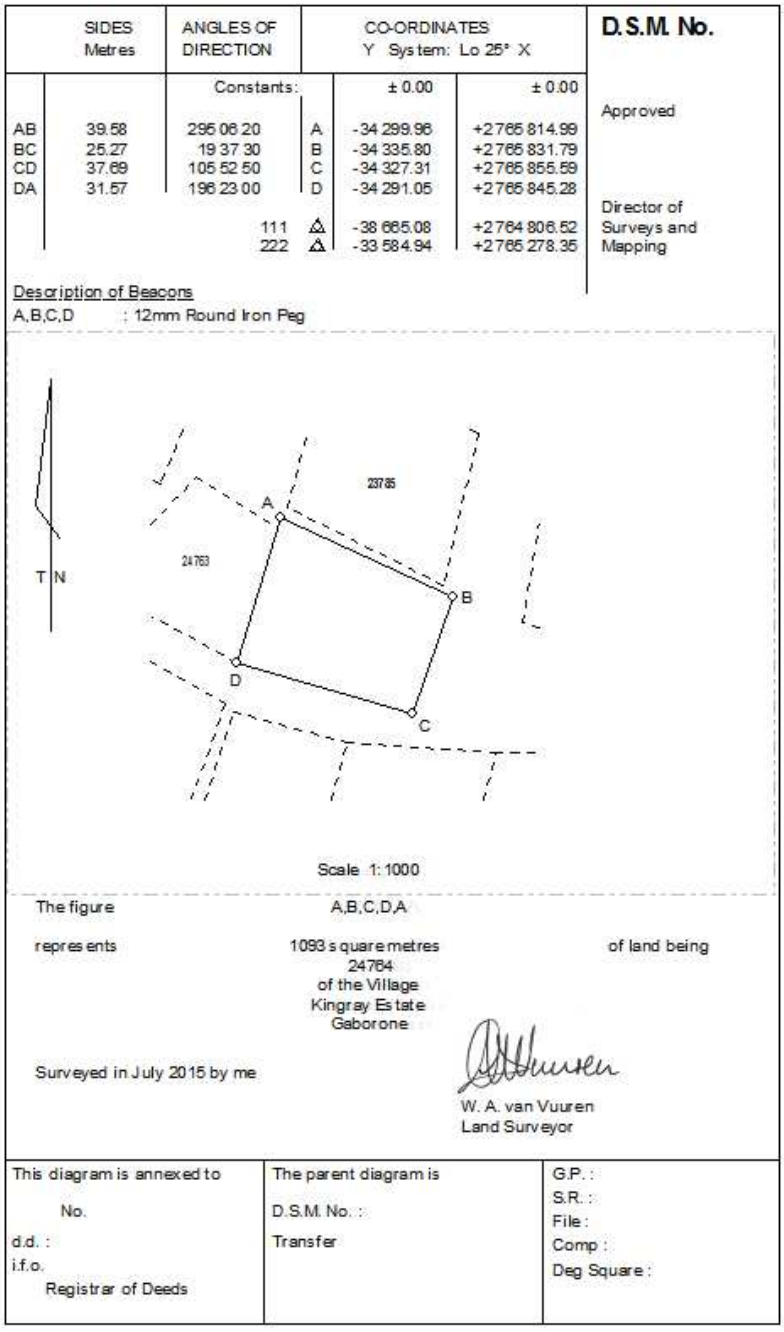
Diagram, then select this option. For the current Diagram, the **Area** and the **Stand number** will be changed to the current values. All other headings will be adopted from those saved from the previous **Diagram**.

- If you want to use the same **signature** as was used in the previous **Diagram**, then select this option.

If either the first or the second of the above three options are de-selected, the programme will allow you to manually enter these values.

Finally, click on the [**Create**] button.

The programme will momentarily switch to the **General CAD** programme, display the Sheet data, locate the Stand identified form the given **Stand Number**, determine the polygon boundaries making up the Stand and then return to the **Diagram CAD** programme.



The above is an example of an **A4** Diagram for **Botswana**. The **Diagram** might still need some editing, such as filling in the Stand numbers of surrounding properties, re-positioning of Beacon Names etc.

Diagram Creation Method #5 – Clicking on a Stand Number on the General CAD Sheet

This is a fully automated method of **Diagram** creation. With reference to the last three options mentioned under **Method #4** above, this method presumes that all three of the options are selected.

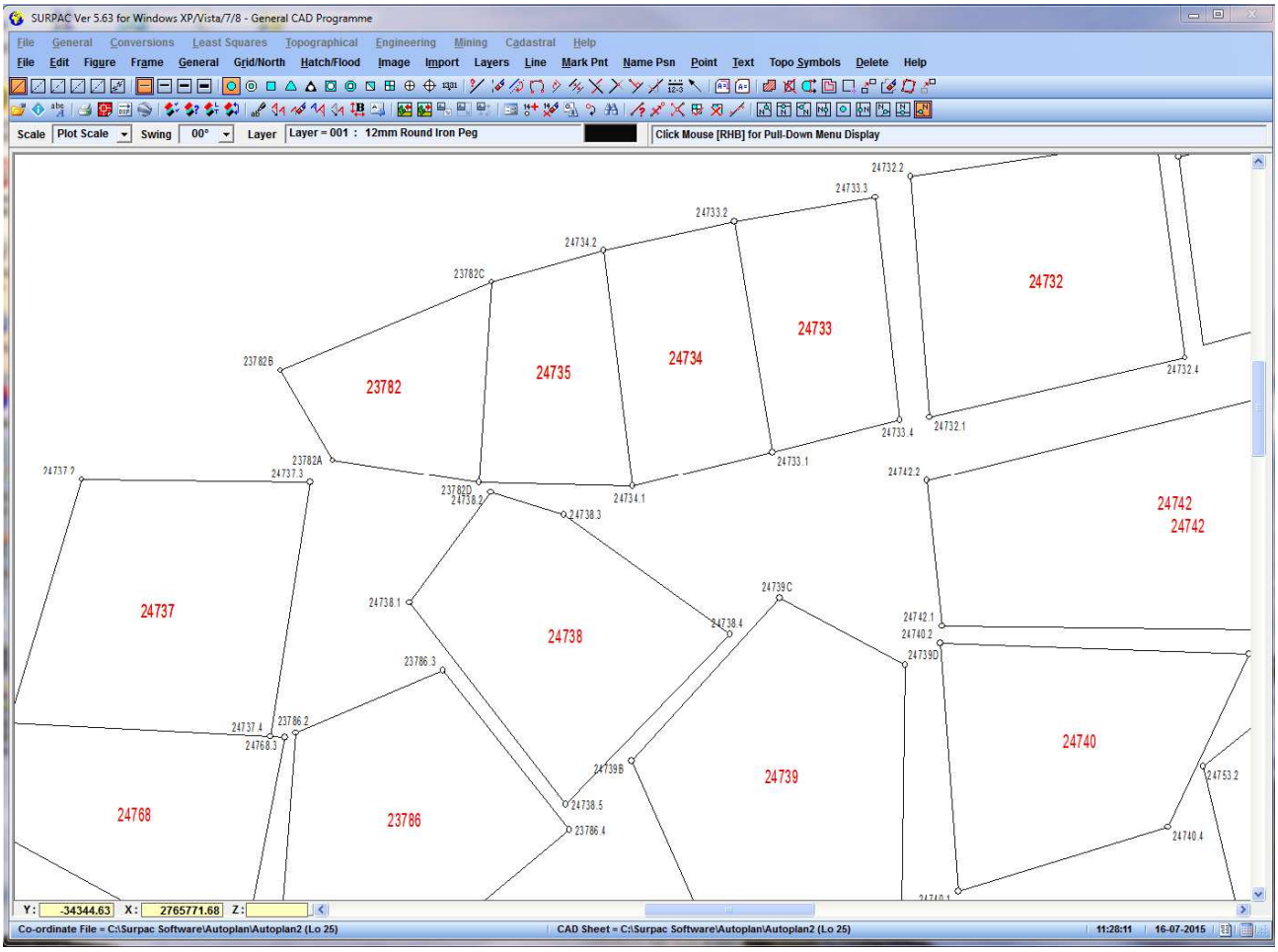
Therefore, if you have a number of **Diagrams** to compile from a single township, for example, then it is best to use any of the previous Methods #1 - #4, to set up the necessary **Country/Province**, **Headings** and **Signature** to compile the initial **Diagram**. Using Method #5 will then automatically adopt these values, changing only the **Area** and **Stand Number** for each **Diagram**.

Programme Operation

Load the **General CAD** programme*. (Refer to the setting up of the **General CAD** Sheet from a **GP** Sheet, as discussed under **Method #4** above).*

Display the portion of the Sheet where the Diagram compilation is to begin. For the display, use a reasonably large scale, such as the plotting scale, to allow the programme to identify all Stand boundaries.

All Text data, other than the Stand Numbers, should be moved to Layer #3. Layer #3 should then be made non-visible. This is to prevent the distance and direction Text items from interfering with the programme's graphic boundary selection process.


SURPAC Ver 5.63 for Windows XP/Vista/7/8 - General CAD Programme
File General Conversions Least Squares Topographical Engineering Mining Cadastral Help
File Edit Figure Frame General Grid/North Hatch/Flood Image Import Layers Line Mark Pnt Name Psn Point Text Topo Symbols Delete Help
Scale Plot Scale Swing 00° Layer Layer = 001 : 12mm Round Iron Peg
Click Mouse [RHB] for Pull-Down Menu Display
24732
24733
24734
24735
23782
24737
24738
24739
24740
24742
24768
23786
Y: -34344.63 X: 2765771.68 Z:
Co-ordinate File = C:\Surpac Software\Autoplan\Autoplan2 (Lo 25)
CAD Sheet = C:\Surpac Software\Autoplan\Autoplan2 (Lo 25)
11:28:11
16-07-2015

Click on the **Figure** menu heading and then select the **Auto diagram Creation Mode**. This should now be shown as **ON** and the top information line should also indicate this.

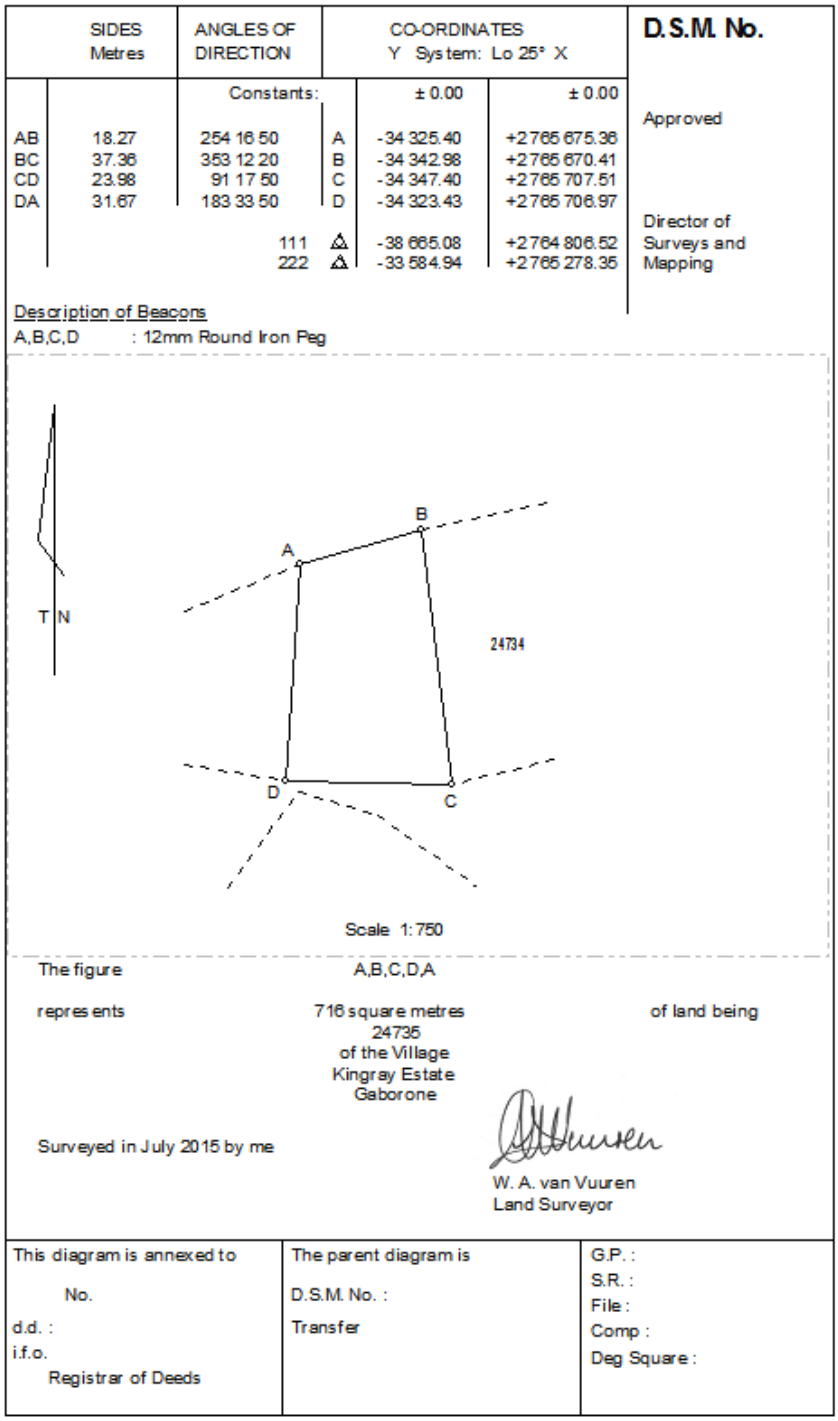
In this mode, the display of Points is suppressed. All that should be visible on the screen should be the boundary **Lines** and the **Stand Number Text** items.

Now simply click near to the bottom left corner of the required **Stand Number**. In this example,

the chosen Stand is **24735**.

The screen will flicker for about a second as the programme locates the Stand (polygon) boundaries, plus the surrounding Line and Text data.

It will then load the **Diagram CAD** programme and display the diagram for the chosen Stand, in this case Stand **24735**.



Make any necessary editing that may be required. On completion, click on the **File** menu heading and select the **Unload the diagram Programme** option.

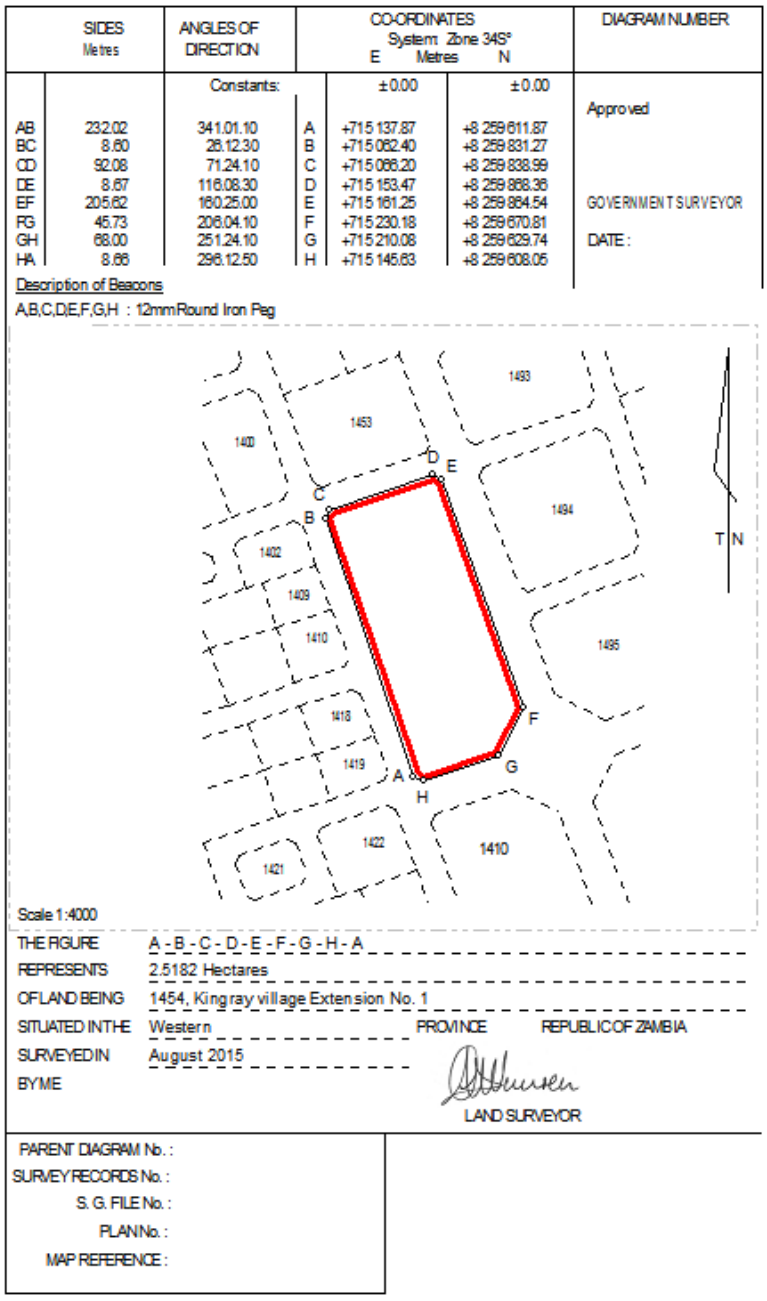
SURPAC will then return you to the **General CAD** programme, where you can simply click on the next Stan Number to generate the next **Diagram**. All Stands for which Diagrams have been generated during the current session will be outlined in purple. This allows Users to quickly see which Diagrams still need to be generated.

On completion of this Method, be sure to again click the **Auto diagram Creation Mode** to return the **General CAD** programme back to its normal mode.

New Diagram Templates for Zambia

New **A4** and **A3 Diagram** templates have been created for **Zambia**. These formats closely follow the requirements of the Office of the Surveyor General, Zambia.

Examples of these new formats are :-



	SIDES Metres	ANGLES OF DIRECTION		CO-ORDINATES System Zone 34S° E Metres	N	DIAGRAM NUMBER
		Constants:		±0.00	±0.00	Approved
AB	232.02	341.01.10	A	+715 137.87	+8 259 611.87	
BC	8.60	26.12.30	B	+715 062.40	+8 259 831.27	
CD	92.08	71.24.10	C	+715 066.20	+8 259 838.99	
DE	8.67	116.08.30	D	+715 153.47	+8 259 868.36	
EF	205.62	160.25.00	E	+715 161.25	+8 259 864.54	GOVERNMENT SURVEYOR
FG	45.73	206.04.10	F	+715 230.18	+8 259 670.81	
GH	68.00	251.24.10	G	+715 210.08	+8 259 629.74	DATE :
HA	8.66	296.12.50	H	+715 145.63	+8 259 608.05	

Description of Beacons

A,B,C,D,E,F,G,H : 12mm Round Iron Peg

Scale 1:4000

THE FIGURE A - B - C - D - E - F - G - H - A

REPRESENTS 2.5182 Hectares

OF LAND BEING 1454, Kingray village Extension No. 1

SITUATED IN THE Western PROVINCE REPUBLIC OF ZAMBIA

SURVEYED IN August 2015

BY ME

LAND SURVEYOR

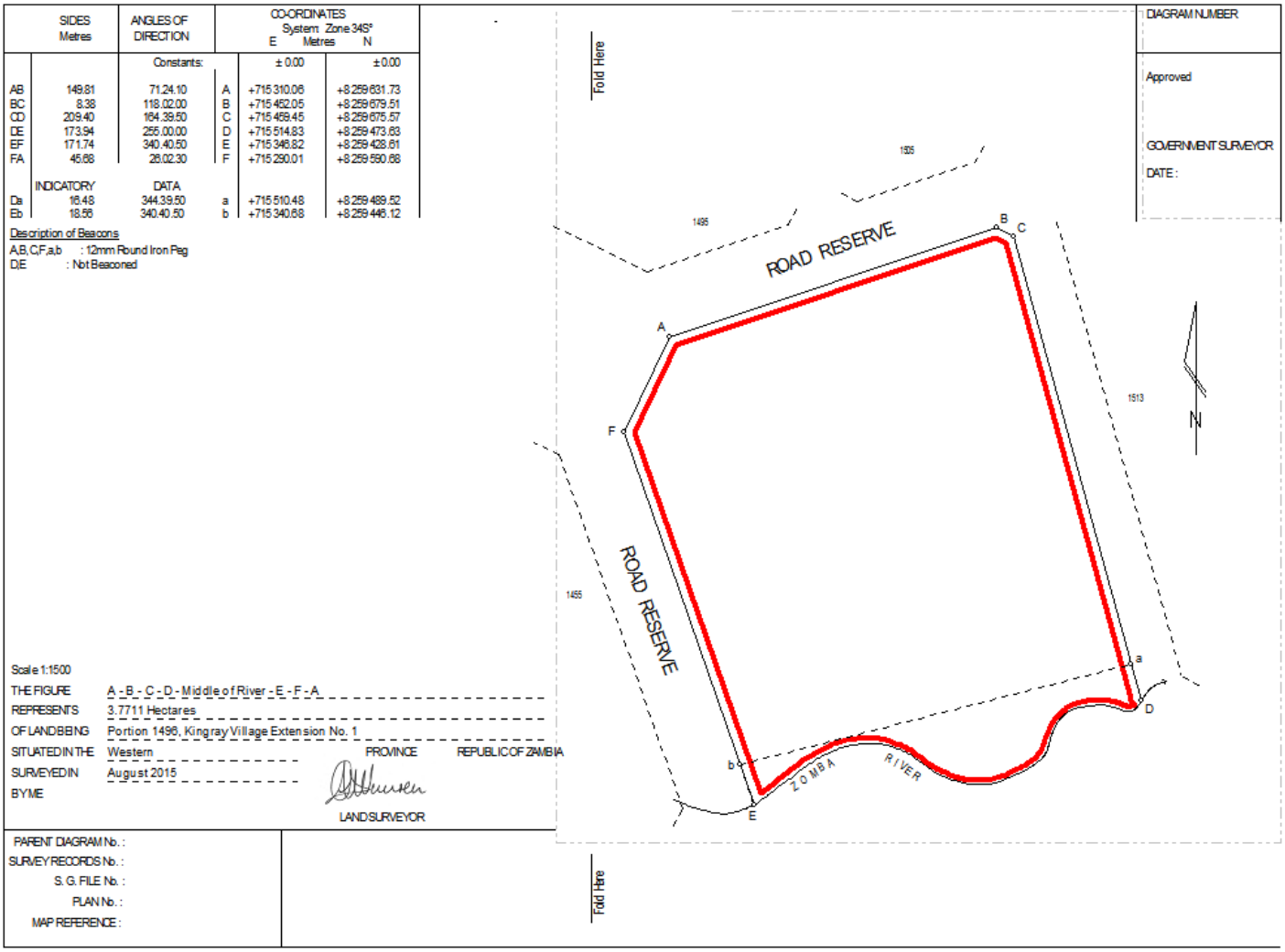
PARENT DIAGRAM No. :

SURVEY RECORDS No. :

S. G. FILE No. :

PLAN No. :

MAP REFERENCE :

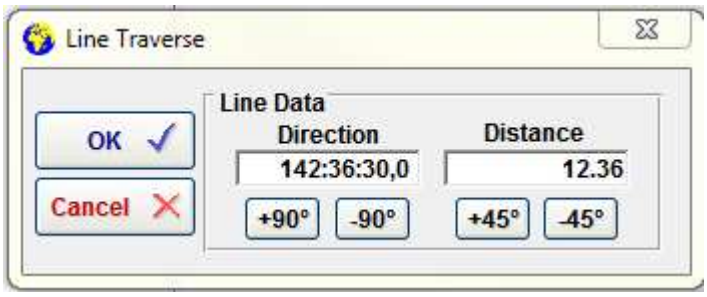


Other SURPAC Additions and Modifications

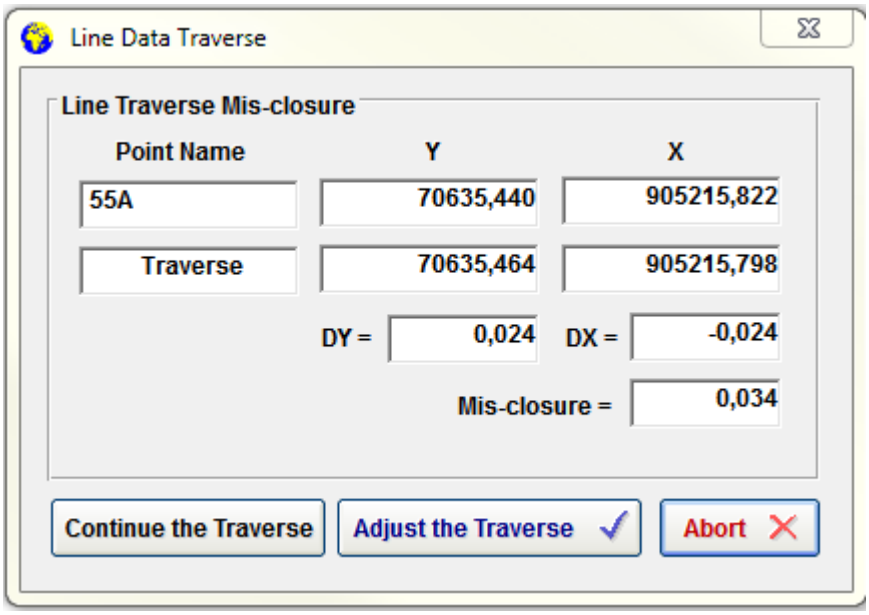
1. **General CAD programme : New function Line Data Traverse**

This function allows Users to create a series of contiguous **Lines** using entered polar data and to check the mis-closure of the **Line Traverse** on an existing Point or Line terminal. The **Line Traverse** will then be adjusted according to the mis-closure.

To use this function, move the cursor close to the required **Line Traverse** starting **Point** , or **Line** terminal. Then, either enter the keyboard shortcut Command [**LV**], or select the menu item **Line Data Traverse** under the **Line** menu heading. The following data entry form will be displayed :-



The programme will continue displaying the above form, waiting for data entry, until a calculated Line Traverse [Y, X] (or [E, N] values fall within 0.20m of an existing and currently visible **Point** or **Line** terminal. When such a point or Line terminal is found, the following form will be displayed :-



To **adjust** the **Line Traverse** and save the adjusted traverse Lines, click the [**Adjust the Traverse**] button. Otherwise, either **Abort** the **Line Traverse**, or continue with the Tra**v**erse to close on another **Point** or Line **terminal**.

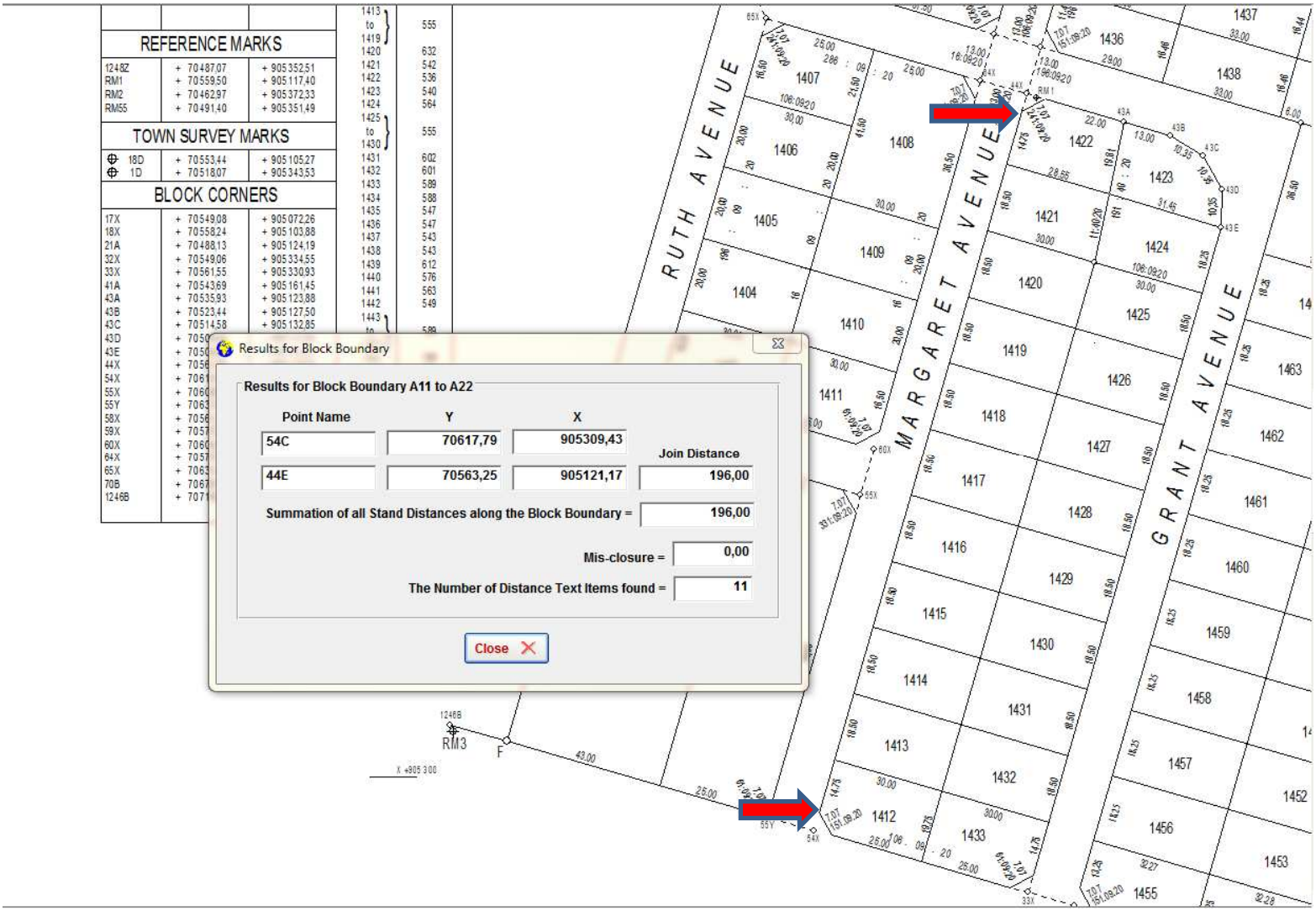
2. **General Plan CAD programme : New function Block Boundary Line Sum Check**

This function allows Users to check the total length of a Block boundary and compare this length with the Distance Text items displayed for individual Stands abutting the Block boundary.

NB : *The programme uses the rounded co-ordinate values of the **Block boundary** terminal Points, as shown on the **GP Data Sheet**. This is to ensure that the distance derived for the **Block boundary** conforms with the join value that would be calculated from the GP Data Sheet values,. As the values stored in the **Co-ordinate** file are accurate to well beyond the mm range, using these values could cause a small difference in the GP Data Sheet derived distance and the Co-ordinate file derived distance.*

To use this function, either enter the keyboard shortcut Command of [**LM**], or select the menu item **Block boundary Sum Check** found under the **Line** menu heading. The screen cursor will change to selection mode. Click on one of the Block boundary terminals then, move to the other Block boundary terminal, and click on it.

NB : *If the Block boundary Points are apex points and if there are splay corners at these apices, use the point where the splays intersect the **Block** boundaries*



The resultant form (above) shows the **Names** and co-ordinate values of the two **Block** boundary terminals selected, the join **Distance** between these two Points, the summation of all **Stand Distances** along the **Block** boundary, the **mis-closure** between the two **Distances** and the number of **Distance Text items** found along the boundary. If the mis-closure exceeds 0.02m this value will be shown in red.

3. **Clarke 1880 (Modified) to/from WGS Transformations (RSA)** : The common control Points (**Trig** and/or TSM points) used in the transformation are now listed after the display of transformed points, showing both System co-ordinate values.

4. **DTM Creation** : Changes have been made to enable the handling of flat (DH < 0.5m) terrain surveys.

5. **Longitudinal Section programme** : The **AutoCAD DWG** output option has been added to this programme. The old HPGL output has been removed.

Some handy Tips for SURPAC Cadastral Users

Tip #1 : Determining a Sheet Layout for General Plans :

Sometimes a **Sheet Layout** for the General Plan Sheets of a large township or development can be quite complex. This task can be made a lot easier by uses available functions in the **General CAD** programme, as follows :-

Step #1 : Carry out the **Line** drawing for the entire Township or Development area in a **General CAD** Sheet, at any appropriate scale. *These **Lines** can be imported into one or more General Plan Sheets once their positions and swings have been determined.*

Step 2 : Display the **General CAD** Sheet at a scale which shows coverage of the entire area.

Step 3 : Before proceeding, the **Scale** for the **General Plan** Sheets needs to be known. This is normally determined by the sizes of the Stands in the Township, bearing in mind that the **Sides** and **Directions** of each Stand need to be written on the **General Plan** Sheets, within the Stand limits.

Step 4 : Using the [**LG**] – **Line Generate** Command, create a rectangle in any vacant area of the **General CAD** Sheet, such that the size of the rectangle represents an **A0** sheet size at the Plotting Scale of the **General Plan** Sheets.

For example, if the General Plan sheets are going to be plotted at a scale of **1 : 250**, the rectangle will need to have **Length = 297.25m** and **Height = 210.0m** *(assuming that the sheets are in Landscape mode*). These values are derived by taking the known size of an A0 sheet (1189mm x 849mm) and multiplying each dimension by 250/1000.

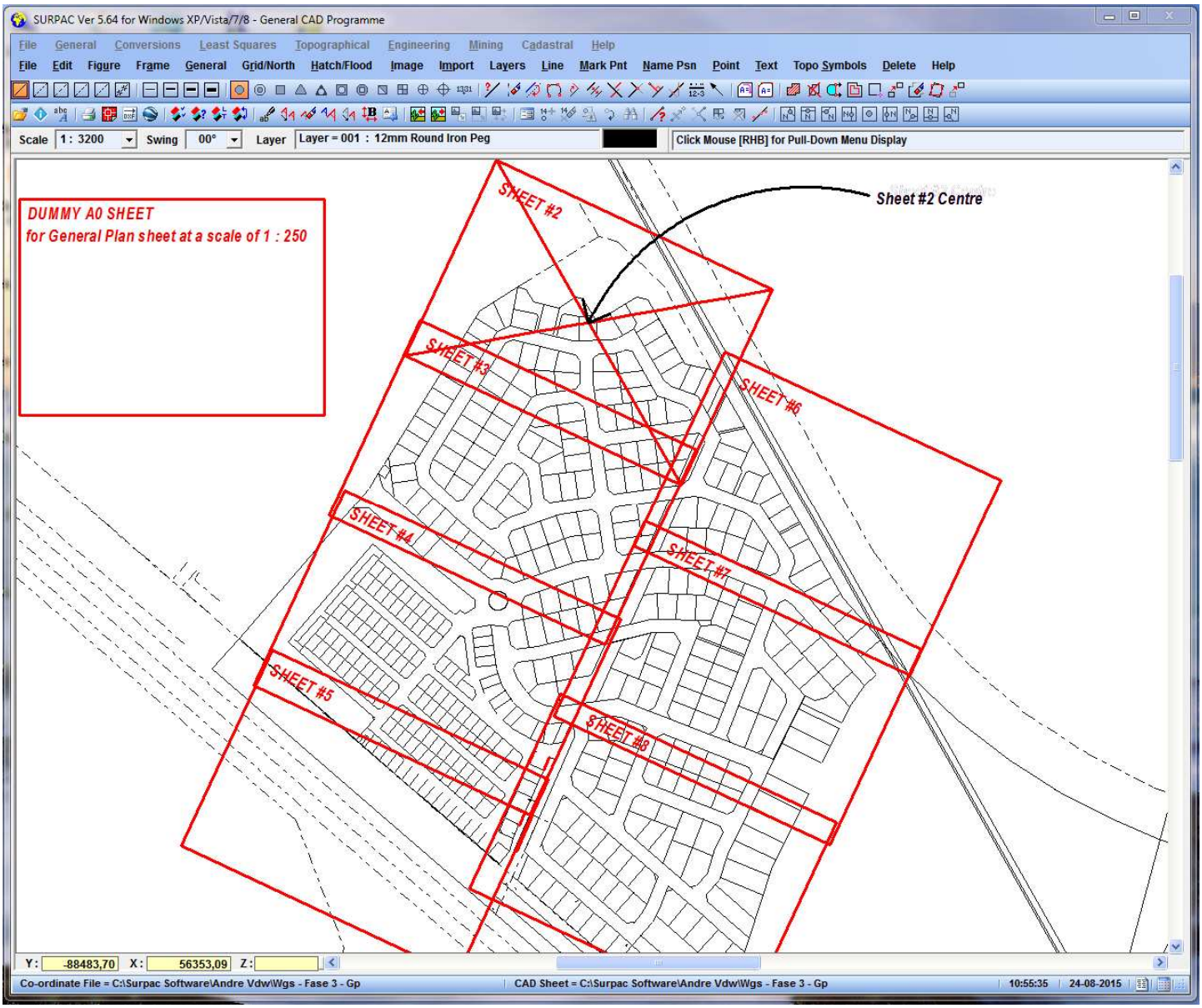
Step 5 : Use the [**FC**] – **Figure Copy** Command to grab a copy of the rectangle and then move this item to the required location and, if required at the required swing. (Refer to the **Help** – **Figure Commands** document (*found under the General CAD Help menu*) to see how a Figure is Copied/Moved/swung etc.

Step 6 : Repeat Step 5, above, for all required **General Plan** sheet positions. Bear in mind the sheet **overlaps** need to be allowed for, as well as for the **sheets margins**.

Step 7 : The **Sheet centre** values can now be easily determined. For example, draw the two diagonals of a sheet, use the [**LU**] - **Line Subdivide** Commands on one of these diagonals, and then **Snap** onto the centre point, created by the diagonals to read the sheet **Centre values**.

Finally, the **Sheet Centre** values and **Sheet Swings** can then be used in the **General Plan** programme to set up the various Sheets. Once this done, all **Line** work can then be imported into each of the **General Plan** Sheets from the **General CAD** Sheet.

See the example on the next page.



A General Plan Sheet Layout determined graphically using the General CAD programme

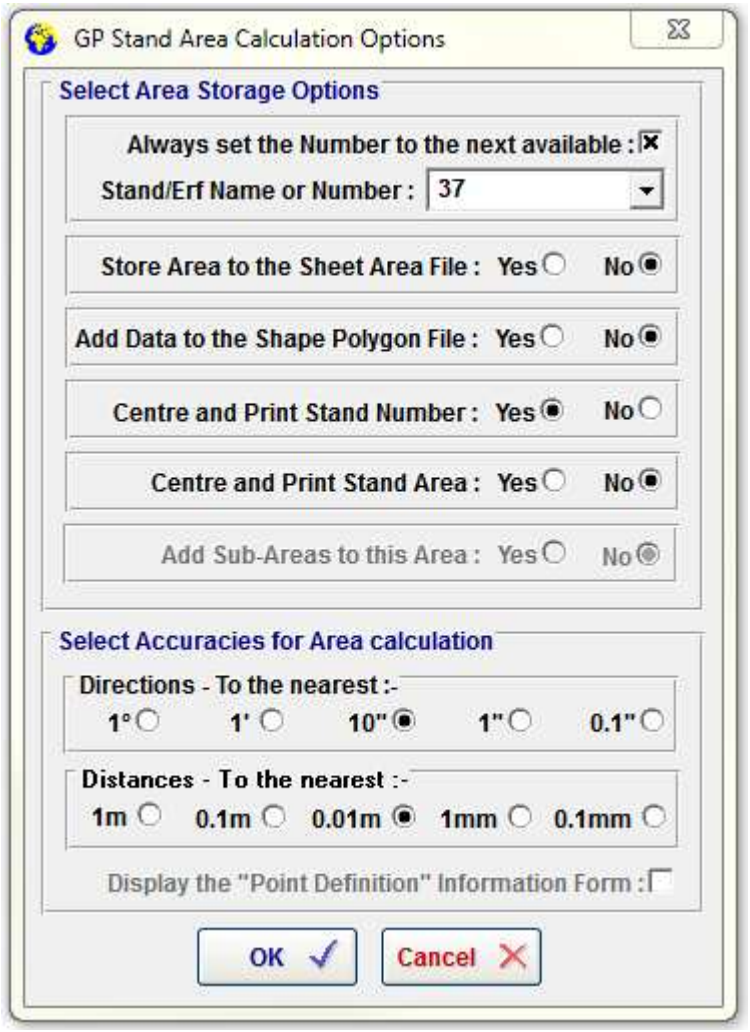
NB *: In the above shown example, the* ***General Plan*** *sheets are to be at a Scale of* ***1 : 250****. Fitting the 8 General Plan sheets, as shown, requires that each General Plan sheet has a Swing of* ***+25°****.*
By using the diagonal construction, Sheet #2 has a Centre of Y = -88366m and X = 56488m.

<u>Tip #2 : Calculating the Sides, Directions and Areas on a General Plan Sheet</u> :

The quickest way of calculating and Writing the **Sides**, **Directions** and **Areas** for Stands on a **General Plan** sheet is by initially using the [**F11**] SFK Command - **Auto Write Stand Data**. Most Users are aware of this, but then do not follow by using the Mouse [**MB**] Command (*to repeat the previous Command*).

The best way of using the [**F11**] Command is as follows :-

Move the cursor into the <u>lowest</u> <u>number</u> Stand in a Block, and then press the [**F11**] SFK. The following form will be displayed :-


GP Stand Area Calculation Options
Select Area Storage Options
Always set the Number to the next available :
Stand/Erf Name or Number : 37
Store Area to the Sheet Area File : Yes No
Add Data to the Shape Polygon File : Yes No
Centre and Print Stand Number : Yes No
Centre and Print Stand Area : Yes No
Add Sub-Areas to this Area : Yes No
Select Accuracies for Area calculation
Directions - To the nearest :-
1° 1' 10" 1" 0.1"
Distances - To the nearest :-
1m 0.1m 0.01m 1mm 0.1mm
Display the "Point Definition" Information Form :
OK
Cancel

The [F11] Auto Write Stand Data and Area Command

Select (check) the option **Always set the Number to the next available :**

Set all other options, as required and then click the [**OK**] button. Once the required Stand Data have been displayed, move the cursor into the Stand that has the next consecutive Stand Number and press the Mouse [**MB**]. Data for this Stand will then be displayed. Move the cursor into the next consecutive Stand Number and again press the Mouse [**MB**]. Continue in this manner until all Stands in the Block are complete. Finally, press the [**F12**] SFK Command to **Auto Write the Block Data**.

SURPAC for Windows XP/Vista/7/8 Version 5.65

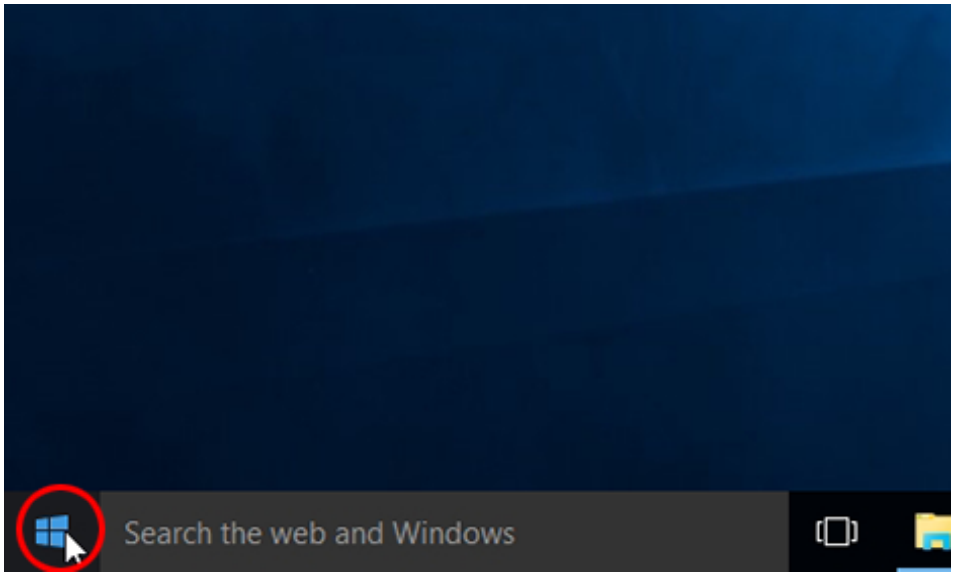
Running SURPAC Software under *Microsoft Windows 10*

SURPAC Ver 5.65 has been tested when running under ***Microsoft Windows 10*** and appears to be completely compatible.

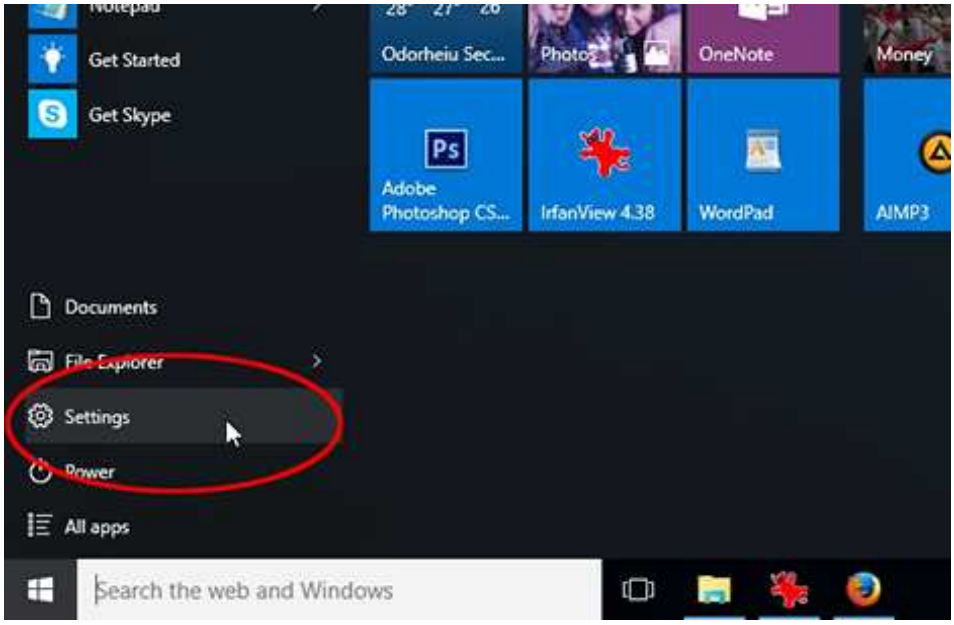
The only problem encountered was with the **Mouse Scroll** button. ***Windows 10*** has a new (and rather strange) setting for the Mouse wheel function, and this new function is set as being the default when ***Windows 10*** is installed. This default setting prevented the Mouse Scroll function from working in any of the **SURPAC** programmes. Fortunately, there is a straight forward resolution to this problem, as follows :-

Changing the Mouse Scroll Setting In *Windows 10* for SURPAC Software

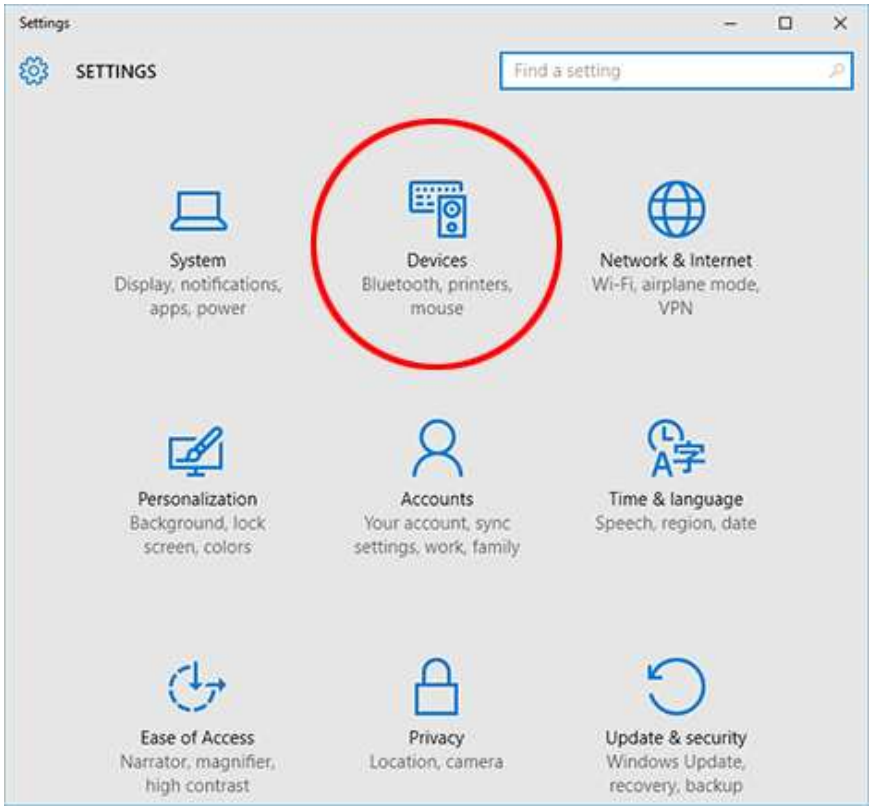
To configure the basic features of your mouse, you need to access the ***Windows 10 Settings*** app. In order to do so, first open the ***Start Menu*** by clicking the ***Start*** button in the bottom left corner of the screen.



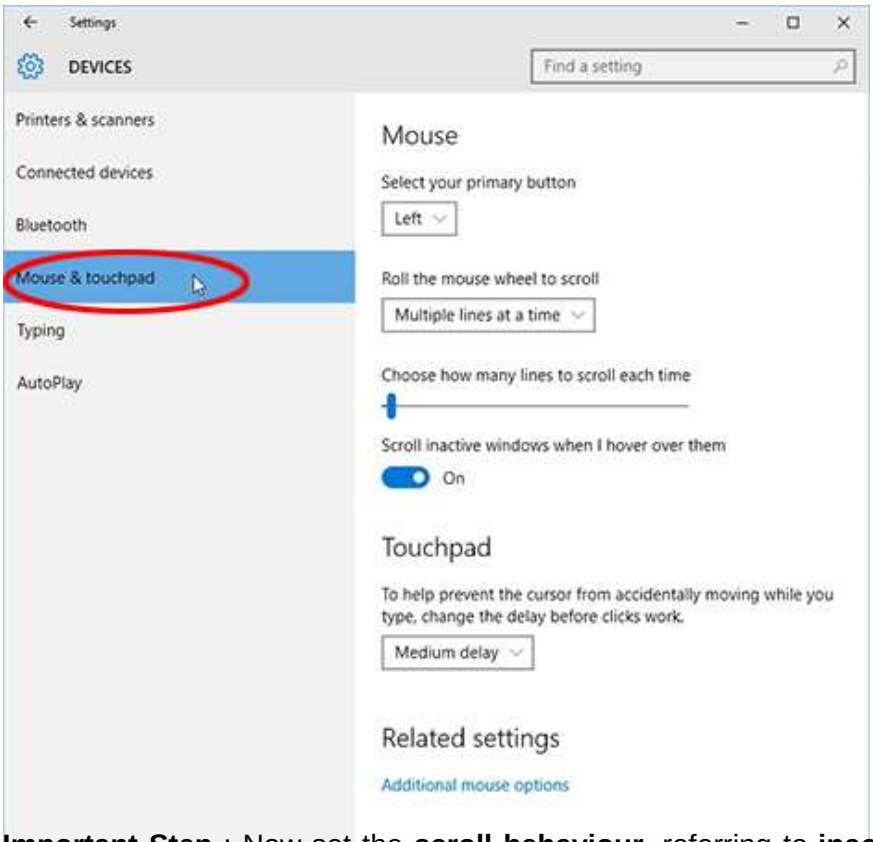
Next, click on ***Settings*** to open the app.



Now, with the ***Settings*** app open, click on ***Devices***.



Now choose ***Mouse & touchpad*** from the menu on the left to open up the mouse configuration screen.



Important Step : Now set the **scroll behaviour**, referring to **inactive windows**, or windows in the background.

If ***Scroll inactive windows when I hover over them*** is set to ***On*** (which is the default) then turn it ***Off*** by clicking on it to change it.

Click on the above option to change the *hover* sending from ***On*** to ***Off***.

NB : *You must also ensure that your device drivers for printers, scanners, RS232C <>USB cables etc., are compatible with* ***Windows 10****. If not, these can generally be down loaded from the internet.*

New : Locating and Adding Nearest TrigNet Points (RSA only)

TrigNet points in South Africa and their use in SURPAC Software

The office of the **Chief Directorate: National Geo-spatial Information** (**NGI**) has issued a list of all **TrigNet** base stations covering the Republic of South Africa. **TrigNet** stations act as fixed point receivers when using the GNSS (Global Navigation Satellite Systems), thus negating the need for Surveyors having to purchase and use two GNSS receivers.

TrigNet is a network of continuously operating GNSS base stations covering South Africa and which are all managed and controlled by a single control centre situated in the offices of National Geospatial Information.

Each of the **TrigNet** remote stations records GNSS data on the two frequencies of GPS at all stations and GPS and GLONASS (for 12 stations only), at a rate of one observation per second commonly known as a 1 sec epoch rate. The data is streamed to the control centre at NGI using dedicated land line connections.

The relative positioning of the **TrigNet** base stations is of high precision, and the stations cover the whole of South Africa.

The data is processed at NGI and made available to users for either post processing or real time applications. Post processing data is made available in the Receiver Independent Exchange (RINEX) format and real time data is made available in the Radio Technical Commission for Maritime Services (RTCM) format and as the names imply, both formats are independent of any specific receiver manufacturer. Real time data is made available to users via the cell phone connections to the internet while in the field.
Currently, this programme is limited to the geographical area of the **Republic of South Africa**, and to surveys whose co-ordinate system is defined as being in the "**WG**" (WGS 84 Ellipsoid) System (in South Africa, the "**Hartebeesthoek94 Datum**").

It is not necessary for the User to define any source file for the location of the **TrigNet** stations as **SURPAC** has a built in Source file called "**TrigNetValues.tnv**". This file must exist in the folder in which **SURPAC** Software is installed (usually the folder "**C:\Surpac Software**").

The above Source file contains the double precision geographical positions (Latitude and Longitude), the Abbreviated Names, Full Names, Heights and Antenna description of all existing **TrigNet** base stations.

This programme will automatically search and extract the required **TrigNet** information from the above Source file.

Since the Source file positions for the **TrigNet** stations are stored in [**Lat**, **Long**] format, any Degree Square boundaries become irrelevant to the programme. Surveys can be located close to any Degree Square boundary, and the programme will still generate its own set of Points, centred about the Survey, or any defined Point in the Survey. Data may be drawn from different Degree Squares for any given Survey.

The programme offers User options for both the selection of **TrigNet** stations, and the display mode used, namely :-

- The **Search Centre position** may be User selected,

- The **number of located TrigNet stations** displayed may be set according to a required **maximum number**, a required **maximum search radius**, or the **total number** of **stations**.

- The **display of located TrigNet stations** may be in order of **Distance**, **Direction** or **Point Name**.

- Any of the **located TrigNet stations** in the displayed list may be tagged as "**not required**", to prevent them from being added to the Co-ordinate file, or displayed on **Google Earth**.

- An **output** of the displayed list of located **TrigNet stations** may be made to the **Printer**, an **ASCII** file, an **Excel** file or the **Clipboard**.

- The **located TrigNet stations** in the displayed list that are marked as "**required**" (i.e. the selected **Bench Marks**) may be **added** to the current **Co-ordinate File**.

- The displayed list of **TrigNet stations** may also be displayed on **Google Earth**.

Using the "Locate and Add Nearest TrigNet Stations" programme

NB : *This programme forms a part of the **Conversions Module** and this Module must be an active part of the **SURPAC** License in order to be able to access the programme.*

The programme is loaded from the **Conversions Menu**, when selecting the **Locate and Add Nearest TrigNet Station (RSA)** Menu Item.

If the current Co-ordinate file is empty, the programme will display a warning message and abort as the Co-ordinate file must contain at least one Point in order for this programme to work.

The Co-ordinate file should have appropriate constants set. If no constants are used, then both the Y an X ordinates must have their full values.

As a starting default, the programme will assume the [Y, X] search position as being the centre of gravity of all existing Points in the current Co-ordinate file. The programme will use the further defaults of a Search Radius of 200Km and the number of Points to display as 5.

The results of this default search will be displayed. You may now change any of the search parameters required, as mentioned on the previous page

Each displayed **TrigNet** station will initially have a green “tick” displayed next to it. This implies that the **TrigNet** is a “required” **TrigNet** station and which would be added to the current Co-ordinate file when the **[Store and Exit]** Button is clicked.

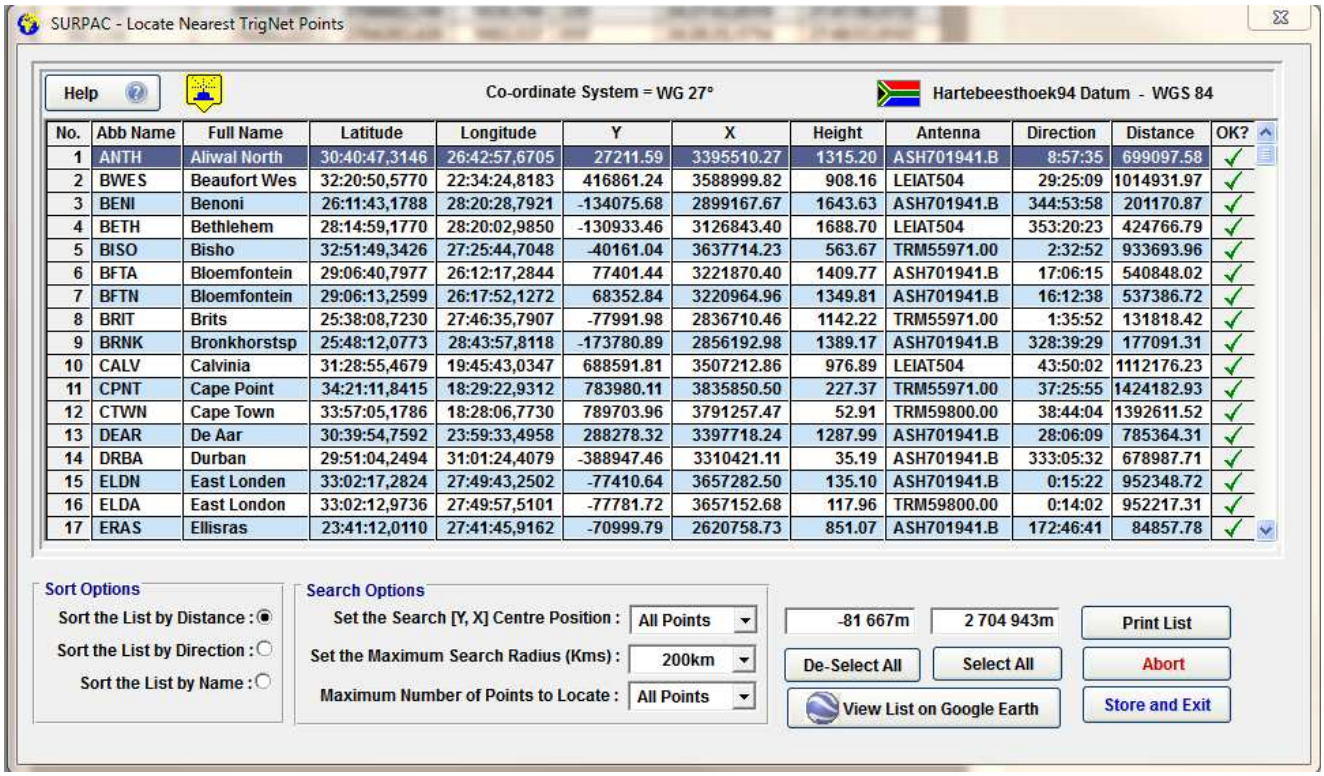
If any **station** is not required, then click on that **TrigNet station**’s green “tick”. The symbol will be changed to a red “cross”, and the **TrigNet** station’s co-ordinate display will be changed to an italic font. This **TrigNet** station will now be flagged as “not required”, and will not be added to the current Co-ordinate file. Clicking a Point’s red “cross” will reverse the above process.

Click the **[Print List]** Button to send all those located and selected **TrigNet** stations to the **SURPAC** Printing form. From this form display, this list may then be sent to the current **Printer**, to a User defined **ASCII** file, to an **Excel** file, or to the Windows **Clipboard**.

When the **[Store and Exit]** Button is clicked, all located **TrigNet** stations displayed in the list, and having the green “tick” symbol next to them, will be **added** to the current **Co-ordinate File**.

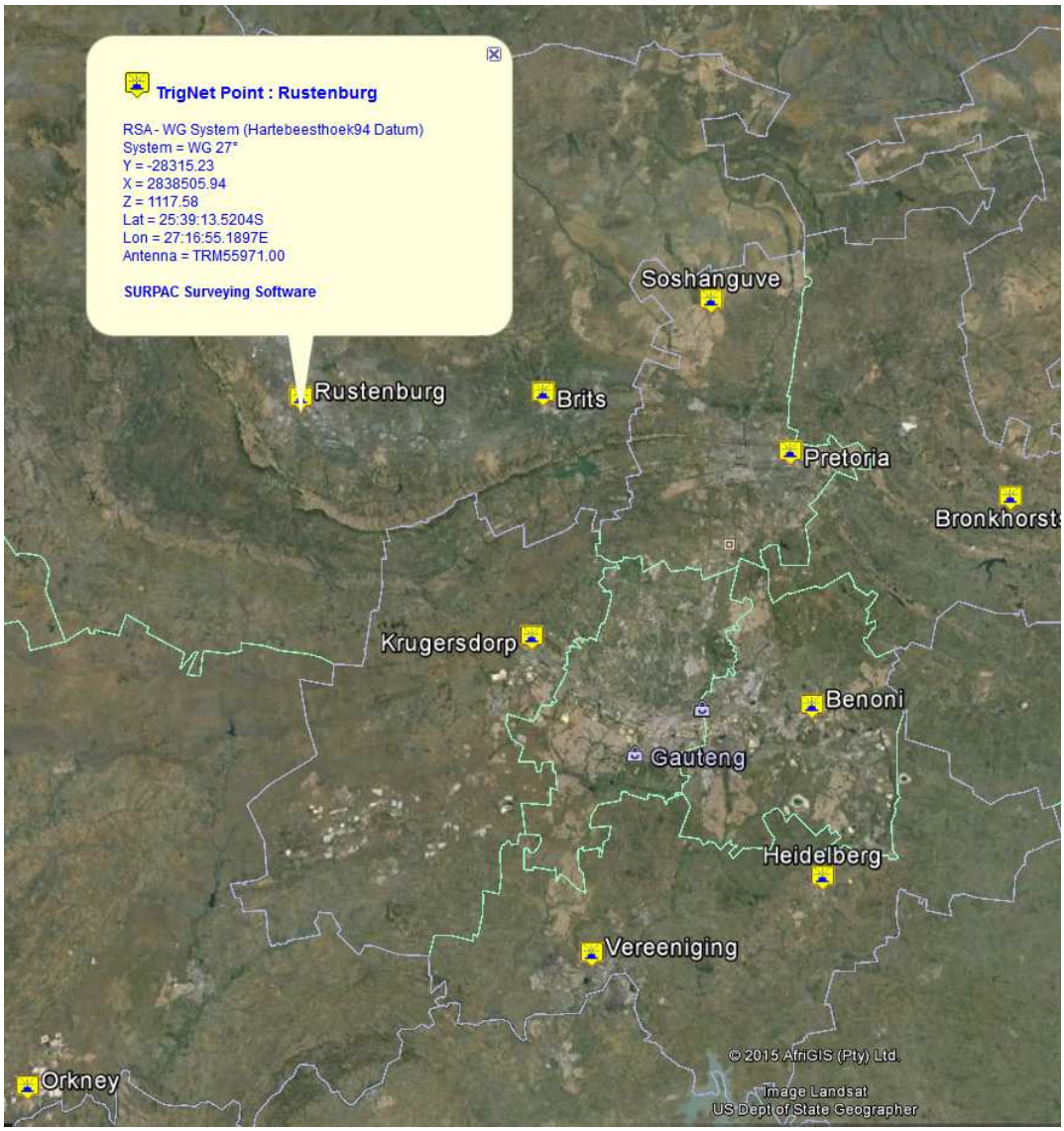
In the button designated “**View List on Google Earth**”, you can send the list of selected **TrigNet** stations to **Google Earth** for a spatial view of the set of **TrigNet** stations.

By clicking on a **TrigNet** stations symbol on the **Google Earth** display, the **TrigNet** station’s co-ordinate and height information is displayed, along with the Latitude, Longitude and Height of the station.



No.	Abb Name	Full Name	Latitude	Longitude	Y	X	Height	Antenna	Direction	Distance	OK?
1	ANTH	Aliwal North	30:40:47,3146	26:42:57,6705	27211.59	3395510.27	1315.20	ASH701941.B	8:57:35	699097.58	✓
2	BWES	Beaufort Wes	32:20:50,5770	22:34:24,8183	416861.24	3588999.82	908.16	LEIAT504	29:25:09	1014931.97	✓
3	BENI	Benoni	26:11:43,1788	28:20:28,7921	-134075.68	2899167.67	1643.63	ASH701941.B	344:53:58	201170.87	✓
4	BETH	Bethlehem	28:14:59,1770	28:20:02,9850	-130933.46	3126843.40	1688.70	LEIAT504	353:20:23	424766.79	✓
5	BISO	Bisho	32:51:49,3426	27:25:44,7048	-40161.04	3637714.23	563.67	TRM55971.00	2:32:52	933693.96	✓
6	BFTA	Bloemfontein	29:06:40,7977	26:12:17,2844	77401.44	3221870.40	1409.77	ASH701941.B	17:06:15	540848.02	✓
7	BFTN	Bloemfontein	29:06:13,2599	26:17:52,1272	68352.84	3220964.96	1349.81	ASH701941.B	16:12:38	537386.72	✓
8	BRIT	Brits	25:38:08,7230	27:46:35,7907	-77991.98	2836710.46	1142.22	TRM55971.00	1:35:52	131818.42	✓
9	BRNK	Bronkhorstsp	25:48:12,0773	28:43:57,8118	-173780.89	2856192.98	1389.17	ASH701941.B	328:39:29	177091.31	✓
10	CALV	Calvinia	31:28:55,4679	19:45:43,0347	688591.81	3507212.86	976.89	LEIAT504	43:50:02	1112176.23	✓
11	CPNT	Cape Point	34:21:11,8415	18:29:22,9312	783980.11	3835850.50	227.37	TRM55971.00	37:25:55	1424182.93	✓
12	CTWN	Cape Town	33:57:05,1786	18:28:06,7730	789703.96	3791257.47	52.91	TRM59800.00	38:44:04	1392611.52	✓
13	DEAR	De Aar	30:39:54,7592	23:59:33,4958	288278.32	3397718.24	1287.99	ASH701941.B	28:06:09	785364.31	✓
14	DRBA	Durban	29:51:04,2494	31:01:24,4079	-388947.46	3310421.11	35.19	ASH701941.B	333:05:32	678987.71	✓
15	ELDN	East Londen	33:02:17,2824	27:49:43,2502	-77410.64	3657282.50	135.10	ASH701941.B	0:15:22	952348.72	✓
16	ELDA	East London	33:02:12,9736	27:49:57,5101	-77781.72	3657152.68	117.96	TRM59800.00	0:14:02	952217.31	✓
17	ERAS	Ellisras	23:41:12,0110	27:41:45,9162	-70999.79	2620758.73	851.07	ASH701941.B	172:46:41	84857.78	✓

The “Locate and Add Nearest TrigNet Stations” programme display



TrigNet Stations on Google Earth, showing data for a selected Station

The full set of **Google Earth** icons used by **SURPAC** Software is now :-

- Trigonometrical Beacons

- Town Survey Marks

- Bench Marks

- Survey Beacons/Points

- Image Placemarks or Polygons

- My Stations

- TrigNet Stations

Please note that the "hot Spot" that identifies the position of the item is the bottom centre of the icon.

References :

NGI (Department of Rural Development and Land Reform)
Teboho Maphakisa – VRS technology as densification to RTK for GPS/GNSS

New : Locating and Adding Nearest Trig Beacons (Botswana & Lesotho)

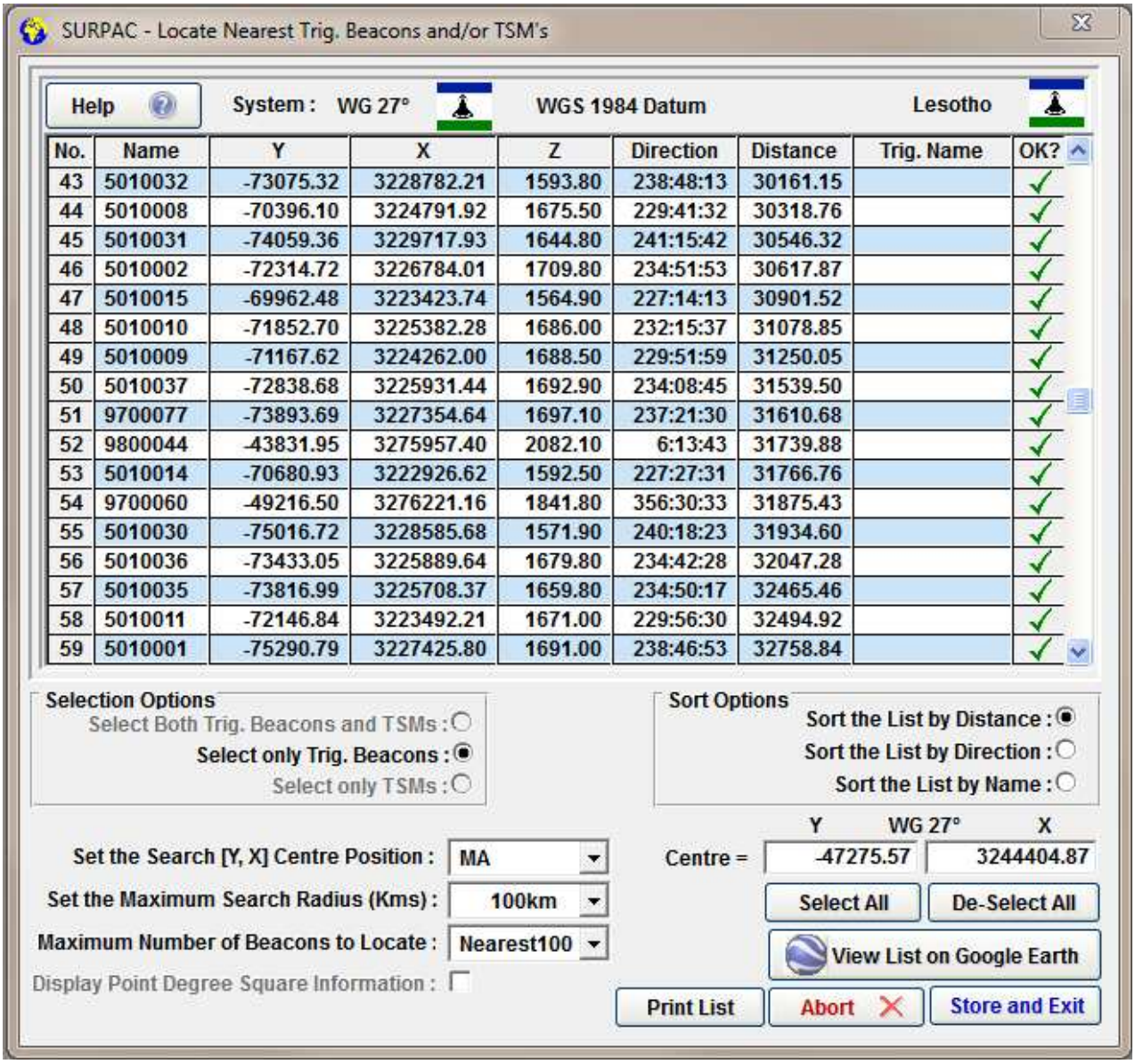
This programme provides the facility of locating a set of the nearest **Trigonometrical Beacons** about a User defined geographical position.

If required, the located Points may be added to the current Co-ordinate File and/or displayed on **Google Earth**, if the **WGS 1984** ellipsoid is set as the current ellipsoid.

This programme has now been extended to cover :-

1. The Republic of **Botswana** for surveys defined as using the **Arc 1950 (Clarke 1880 (Modified) Ellipsoid)** System or the **Universal Transverse Mercator (UTM) Zone 35s System (Clarke 1880 (Modified) Ellipsoid)**.

2. The Kingdom of **Lesotho** for surveys defined as using either the **Arc 1950 (Clarke 1880 (Modified) Ellipsoid)** System, or the **"WG" (WGS 84 Ellipsoid)** System.



Display of selected Trig Beacons in the North Western area of Lesotho

Display of sample Trig Beacons for NW Lesotho on google Earth

Running the Programme

The programme may be loaded in any of three different ways, namely :-

1. Using the "Locate and Add the Nearest Trig/TSM Beacons" Menu Item under the **Conversions Menu**, or

2. In the **Co-ordinate Editing** Programme, click the Mouse RHB and from the displayed Menu, select the "Locate and Add Nearest Trig/TSM Beacons" Item, or

3. In the **Co-ordinate Editing** Programme, click the [**Options**] Button, select the "Locate and Add Nearest Trig/TSM Beacons" option and then From the **Conversions** Menu, select the Locate and Add Nearest click the [**OK**] Button.

Volume Calculations using Cloud Compare (Improved)

*Following a request I made to the author of **Cloud Compare** Software, I am pleased to report that the function for determining volumes between two surfaces (or a surface and a plane) in **Cloud Compare** has been considerably improved. The routine now used for volume determination in **Cloud Compare** is now as follows :-*

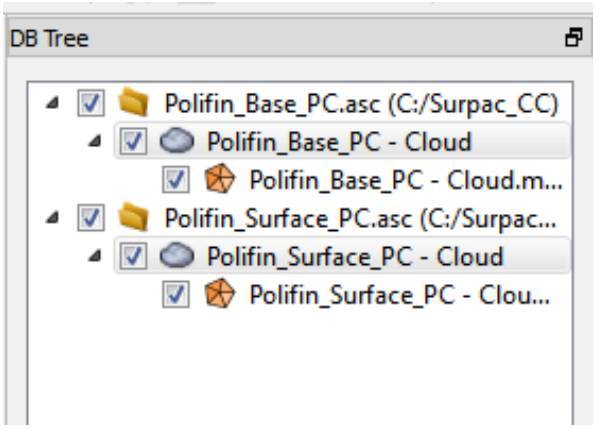
NB : *The **Cloud Compare** Software is currently only available in **64** bit format at this stage. Future versions will support both 32 bit and 64 bit Windows operating systems.*

Computing Volumes from SURPAC DTMs in CloudCompare

A useful benefit from creating Delaunay Mesh files for the **Surface** and **Base DTM**s, is the ability to compute the **Volume** between these two surfaces.

This is done as a single calculation. The **Volume** estimation calculation in **Cloud Compare** allows for the selection of two loaded models. These two models can be either the Surface and Base models of a single survey, such as a dump or open pit, or they can be any two models having a common overlap area.

First, in the **DB Tree** window, **highlight** (select) the two **Cloud** files (not the mesh files) between which the volume is to be determined.

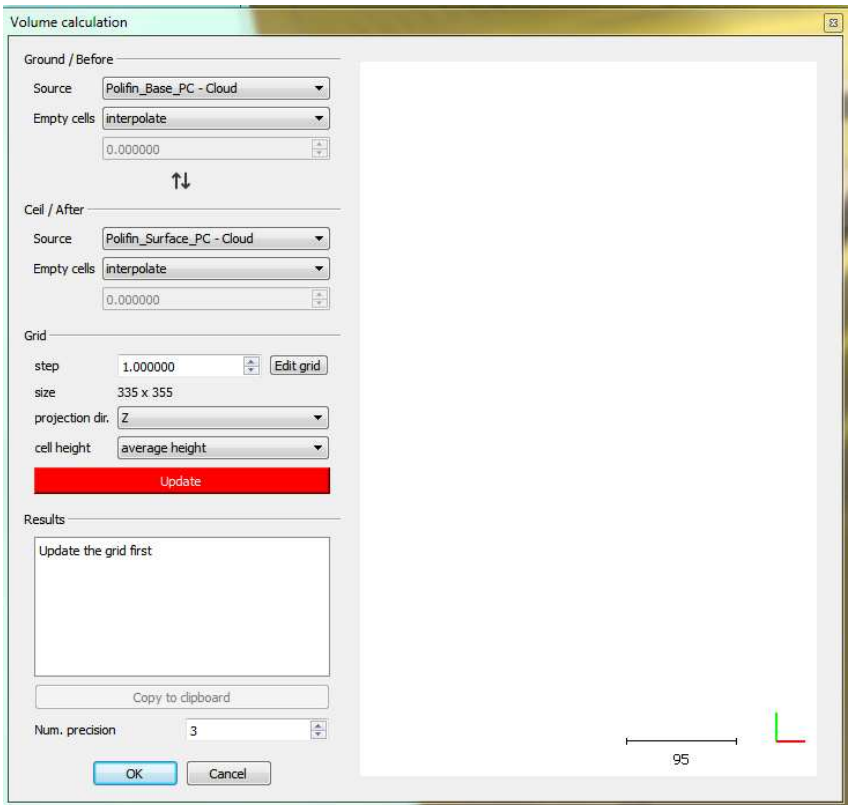


The image above shows the **highlighted** (selected) entities being the **Cloud** files for the Surface ***Polyfin_Surface_PC*** and for the base ***Polyfin_Base_PC***.

Now follow the menu path :-

Tools/ Volume/Compute 2.5D volume

The following form will now be displayed :-

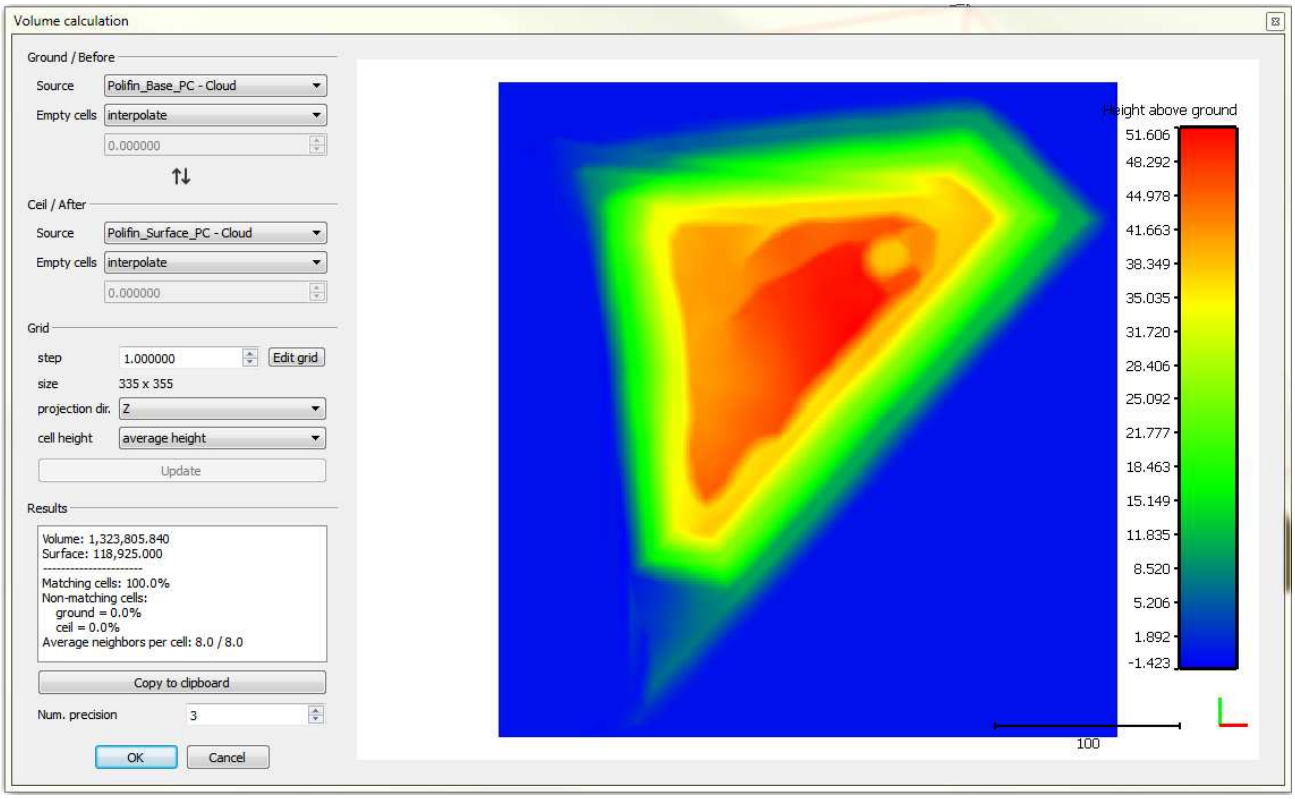


Ensure that the **Base** file is set as the Source for the **Ground/Before** model and that the **Surface** file is set as the **Ciel/After** model. These can be interchanged by clicking on the up/down arrows.

For both models, set the **Empty cells** option as **interpolate**, unless you have any reason for wanting these cells to be ignored.

The Step value can be left as 1.0000, or changed to any more appropriate value.

After all items have been set, click on the red bar labelled **Update**.



The result of the **volume** calculation will be displayed in the lower left hand box, labelled **Results**.

For the above example, the **Cloud Compare** Volume estimation is **1,323,806 m³**.

To determine the net volume between the two surfaces, it is necessary to divide the above result by the **Vertical Exaggeration**, which in this case **2.0**.

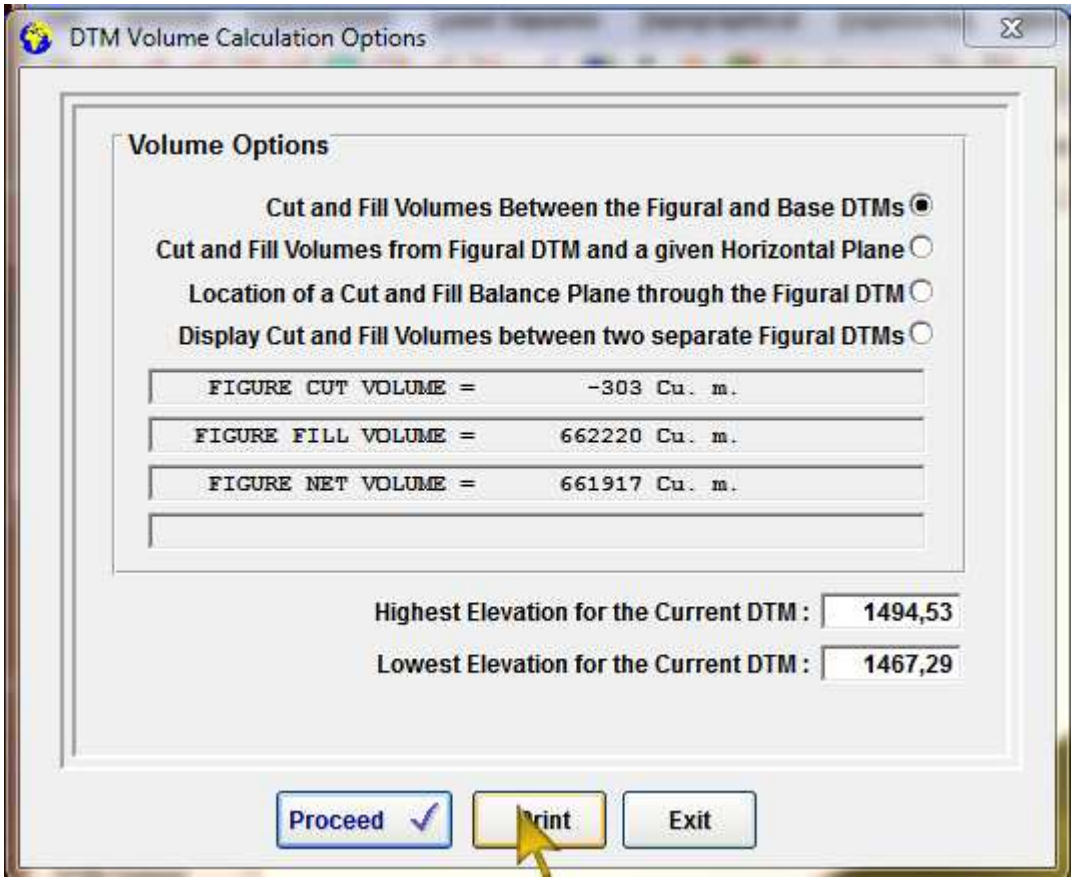
This gives a **Net Volume = (1,323,806)/2 = 661,903 m³** (survey unit for this example is metres)

Comparing the CloudCompare Volume with the SURPAC Volume

The same volume can be calculated in **SURPAC**, albeit following simpler steps. In the **Digital Terrain Modelling** programme, click on the [**Volumes**] button at the left of the display. On the **Volume** Options form that will be shown, select the item :-

Cut and Fill Volumes Between the Figural and Base DTMs

and then click the [**Proceed**] button.


DTM Volume Calculation Options
Volume Options
Cut and Fill Volumes Between the Figural and Base DTMs
Cut and Fill Volumes from Figural DTM and a given Horizontal Plane
Location of a Cut and Fill Balance Plane through the Figural DTM
Display Cut and Fill Volumes between two separate Figural DTMs
FIGURE CUT VOLUME = -303 Cu. m.
FIGURE FILL VOLUME = 662220 Cu. m.
FIGURE NET VOLUME = 661917 Cu. m.
Highest Elevation for the Current DTM : 1494,53
Lowest Elevation for the Current DTM : 1467,29
Proceed
Exit

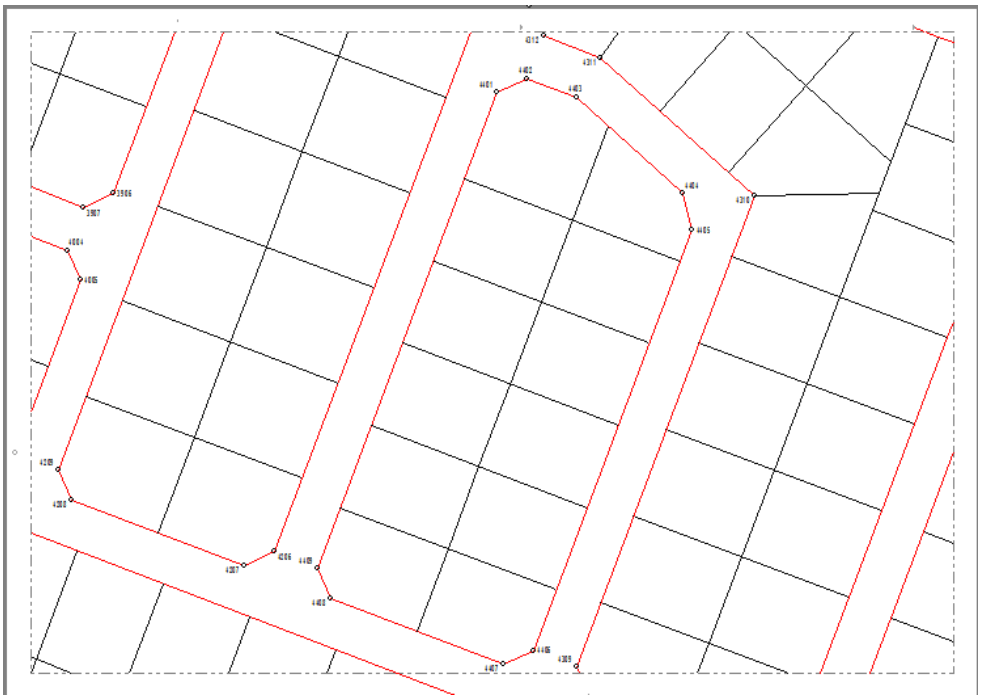
The resultant net **Volume** from **SURPAC** is **661,917 m³**. Hence the difference in net **Volume** between **SURPAC** and **CloudCompare** for this survey is:-

Volume Difference = 661,917 – 661,903 = 14 m³ (or 0.002%).

Other SURPAC Modifications or Additions

1. **General CAD and General Plan CAD** - Importing **General CAD** Sheet data into another **General CAD** Sheet or into a **General Plan** Sheet has been improved. The Line data imported is now restricted to the area within the margins of the new Sheet. Lines that extend

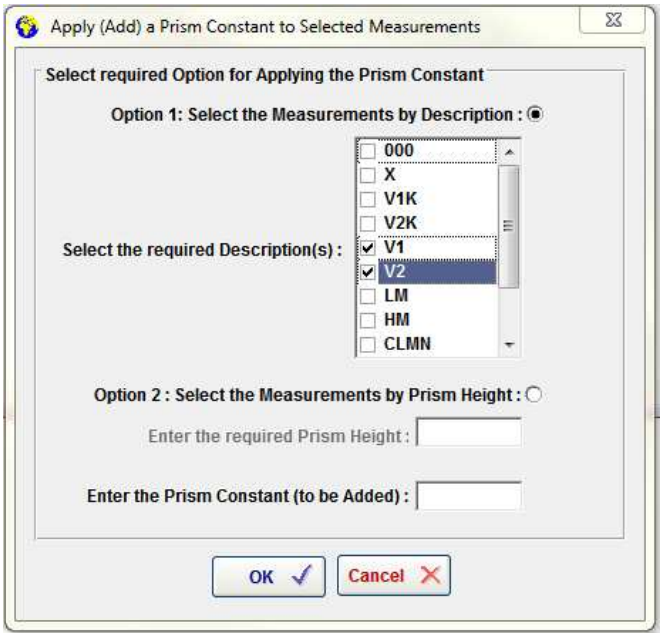
beyond the margins are clipped so as to show only those line portions that lie within the sheet margins.



General CAD Sub Sheet created by Importing Data from a General CAD Main Sheet

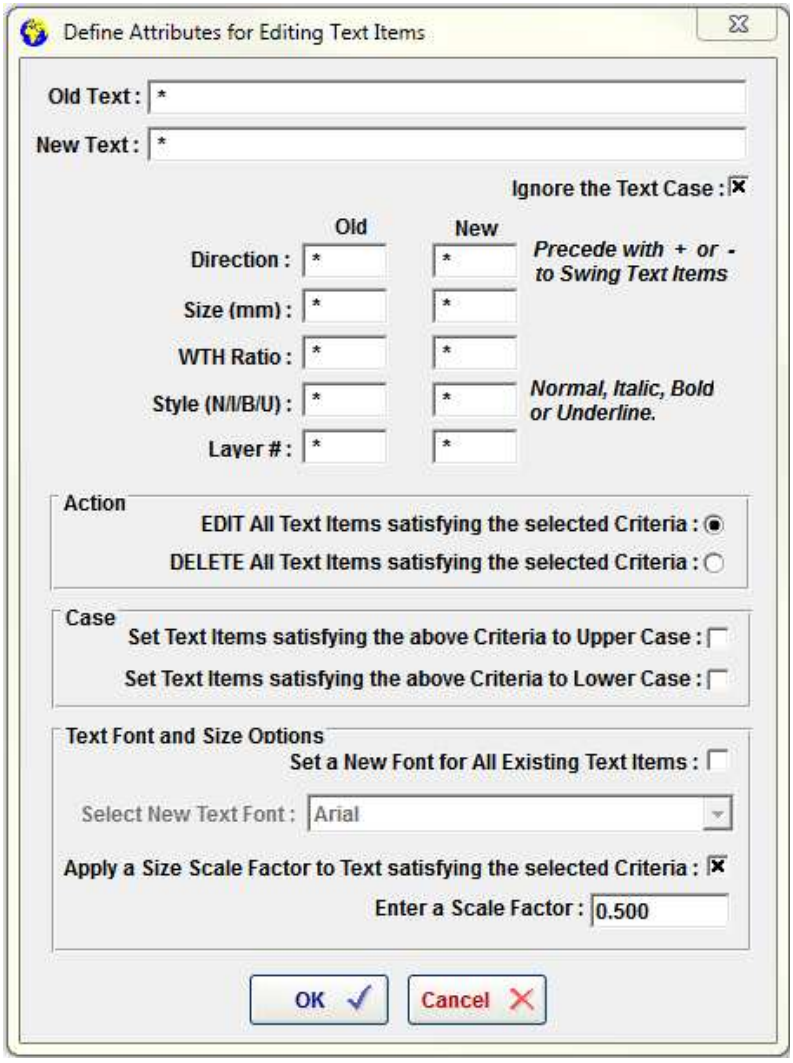
2. **<u>Observation files</u>** – **Observation** files may now be printed in either Field Book or Raw Data mode, showing either **Horizontal** Distances or **Slope** distances. In the former case, the Horizontal distances are computed from the Slope distance and the Vertical Angle. Other values affecting the distance, such as Sea Level and Scale Enlargement are <u>not</u> applied.

   A new option has been added for **Observation** files (under the [**File Options**] button) that allows for the addition of Prism constant to User selected observations. The required observations can be selected by either Point Description(s), or Target Height.



3. Further modifications have been made to the **Zambia Diagram** template to comply with the SG Zambia regulations. These include the automatic Scale values for the Diagram, the position of the North Point and the auto-naming of the Diagram number.

4. A new feature has been added to the **Reset Text Attributes** function.


Define Attributes for Editing Text Items
Old Text : *
New Text : *
Ignore the Text Case :
Old
New
Direction : * *
Size (mm) : * *
WTH Ratio : * *
Style (N/I/B/U) : * *
Layer # : * *
Precede with + or - to Swing Text Items
Normal, Italic, Bold or Underline.
Action
EDIT All Text Items satisfying the selected Criteria :
DELETE All Text Items satisfying the selected Criteria :
Case
Set Text Items satisfying the above Criteria to Upper Case :
Set Text Items satisfying the above Criteria to Lower Case :
Text Font and Size Options
Set a New Font for All Existing Text Items :
Select New Text Font : Arial
Apply a Size Scale Factor to Text satisfying the selected Criteria :
Enter a Scale Factor : 0.500
OK
Cancel

This new feature allows you to apply a **Scale Factor** to all existing Text items on the Sheet, that satisfy the criteria selected on the form. Leaving all options as default (i.e. no changes) will cause the programme to apply the entered **Scale Factor** to all Text items. This applies to all CAD programmes.

5. The “bug” found in the **AutoPlan GP Creation** function in the **General Plan CAD** programme has been fixed.